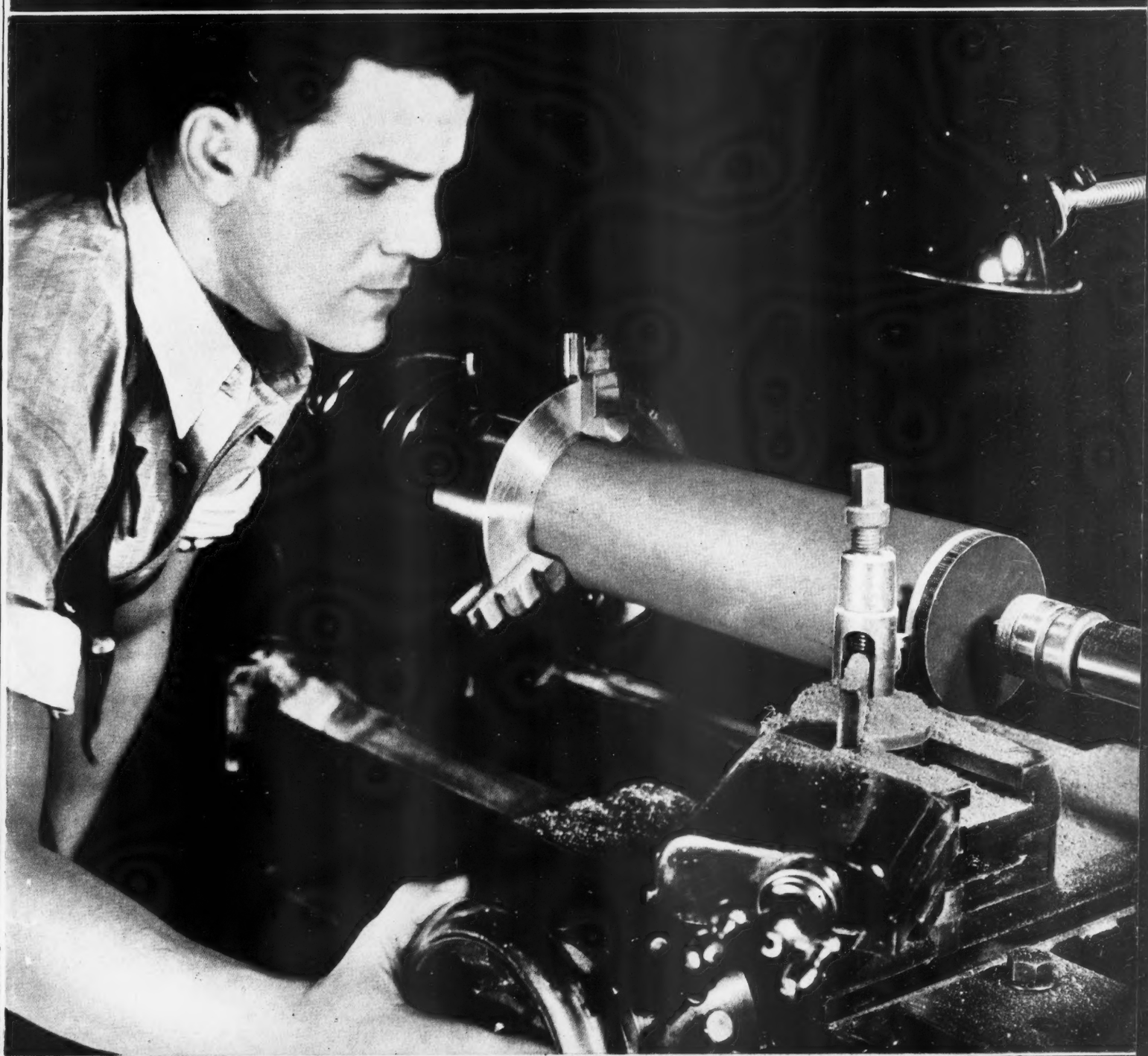
APRIL, 1939

FACTORY

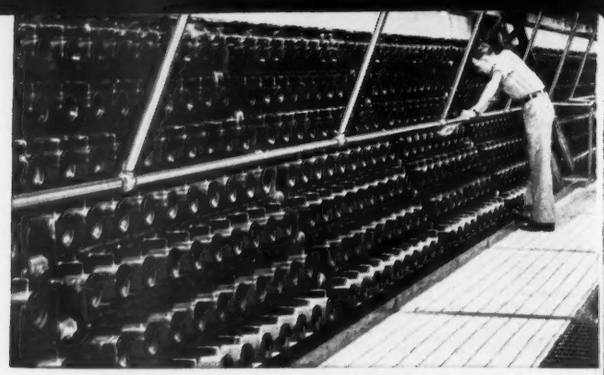
MANAGEMENT and MAINTENANCE

A McGRAW-HILL PUBLICATION

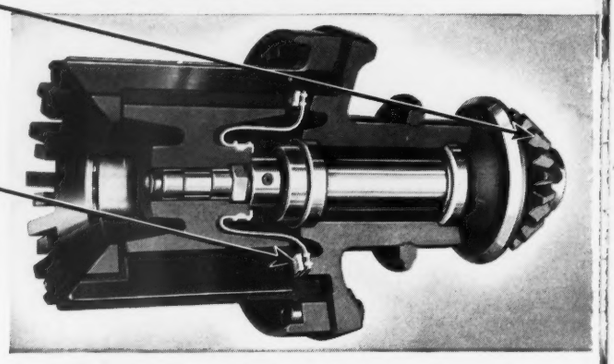


Fifth Annual Special Section **INDUSTRIAL PLANT BUILDINGS**

To Put OFF
MAINTENANCE TROUBLES
Put in SYNTHANE

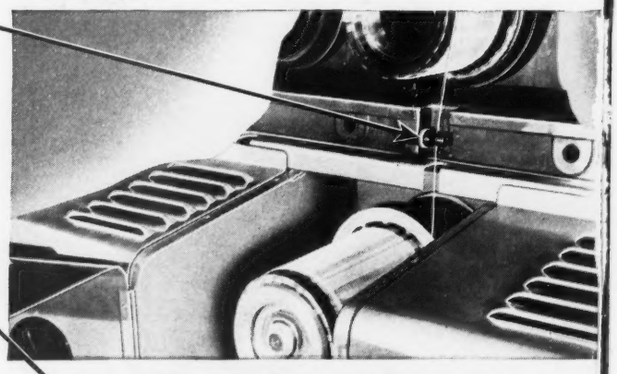


CASCADE OF REELS on which the viscose rayon yarn is carried through ten consecutive operations continuously.

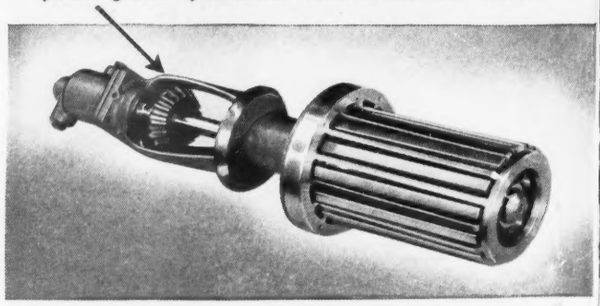


PROCESS REEL GEAR—The driving gear on the end of the shaft is made from Synthane laminated material molded to a one cut finish. 800 of these gears on one machine. Specifications: no lubrication; light load; continuous operation; maximum life; minimum noise; minimum servicing; minimum cost.

REEL SEAL WASHER—In each process reel there is a seal washer cut from Synthane Bakelite-laminated. Specifications: resistance to broad range of corrosive chemicals; high strength factor; great accuracy; maximum stability of dimensions; maximum rigidity.



THREAD GUIDE HOLDER WASHERS used on all thread process guides. Specifications: Same as Reel Seal Washer.



A SYNTHANE GEAR on the end of a vertical drive shaft meshes with the metal Drying Reel Gear in the photo above. Specifications for the Synthane Gear: Same as Process Reel Gear.

—that's what Industrial Rayon Corporation did in its new continuous viscose spinning plant at Painesville, Ohio

Your endless job of lowering equipment maintenance costs isn't the easiest in the world. But maybe we can help you make it easier. Often an examination of equipment shows that certain of the materials used in its construction aren't standing up. A simple change to Synthane Bakelite-laminated might clear up the trouble, lower maintenance costs and improve performance.

At least, that is the experience of many companies who have tried Synthane. The Industrial Rayon Corporation PUT OFF MAINTENANCE TROUBLES when they PUT IN SYNTHANE. The problem they gave us was the production of two gears, a seal and a washer whose specifications are shown at the right. For the seal and washer there was *no* existing material. So we developed one.

The reason Synthane is unusually effective—and may be in your case—lies in its combination of corrosion resistance, high strength-to-weight ratio, low moisture absorption, machineability, high dielectric strength, hardness and other properties—available in standard grades of Synthane or developed especially to meet your service conditions.

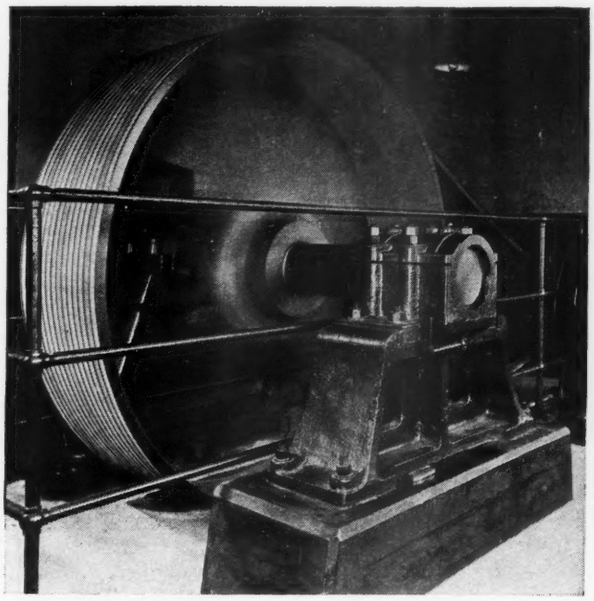
Why not let us have a look at some of your sore spots in maintenance? No obligation, of course.

SHEETS • RODS • TUBES • FABRICATED PARTS • SILENT STABILIZED GEAR MATERIAL

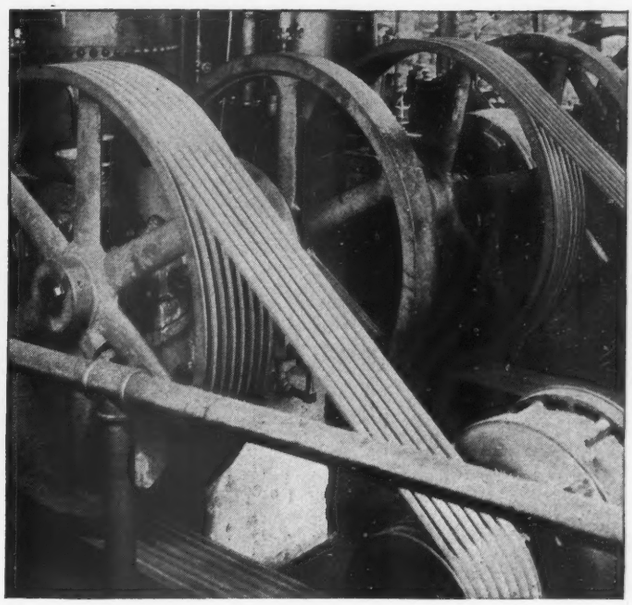
SYNTHANE CORPORATION, OAKS, PENNSYLVANIA

SYNTHANE
Bakelite— laminated

Here's why Goodrich V-Belts last longer, save you time and money

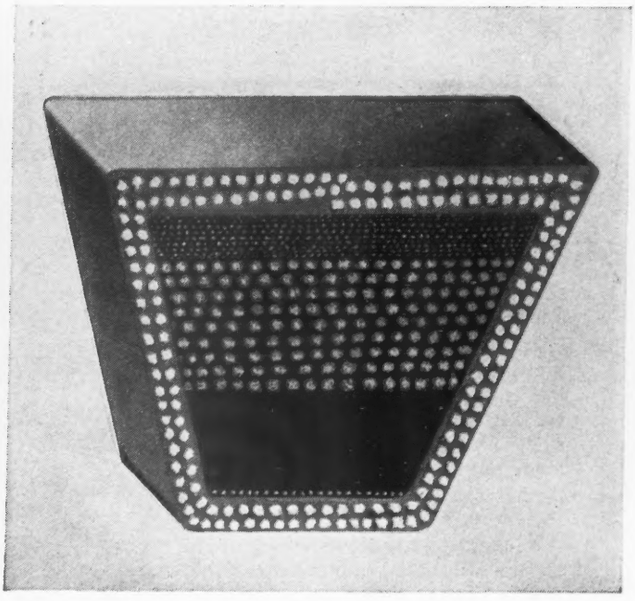


Cool Rubber. Goodrich V-Belts are made with a rubber compound which operates 75% cooler than the rubber in many other well-known makes, and keeps Goodrich Belts below the point of destructive internal heat.



Matched Sets. You can buy Goodrich V-Belts in sets matched under actual operating tension. In such sets each belt carries its full share of the load, there is less slippage, more even wear, more power delivered, longer life.

Tough fabric cover impregnated with rubber prevents damage from dust, grit, fumes, moisture which would open the plies of unprotected belts.



Anti-stretch cords developed by Goodrich engineers reduce harmful slippage, and help Goodrich Belts deliver more power more evenly.

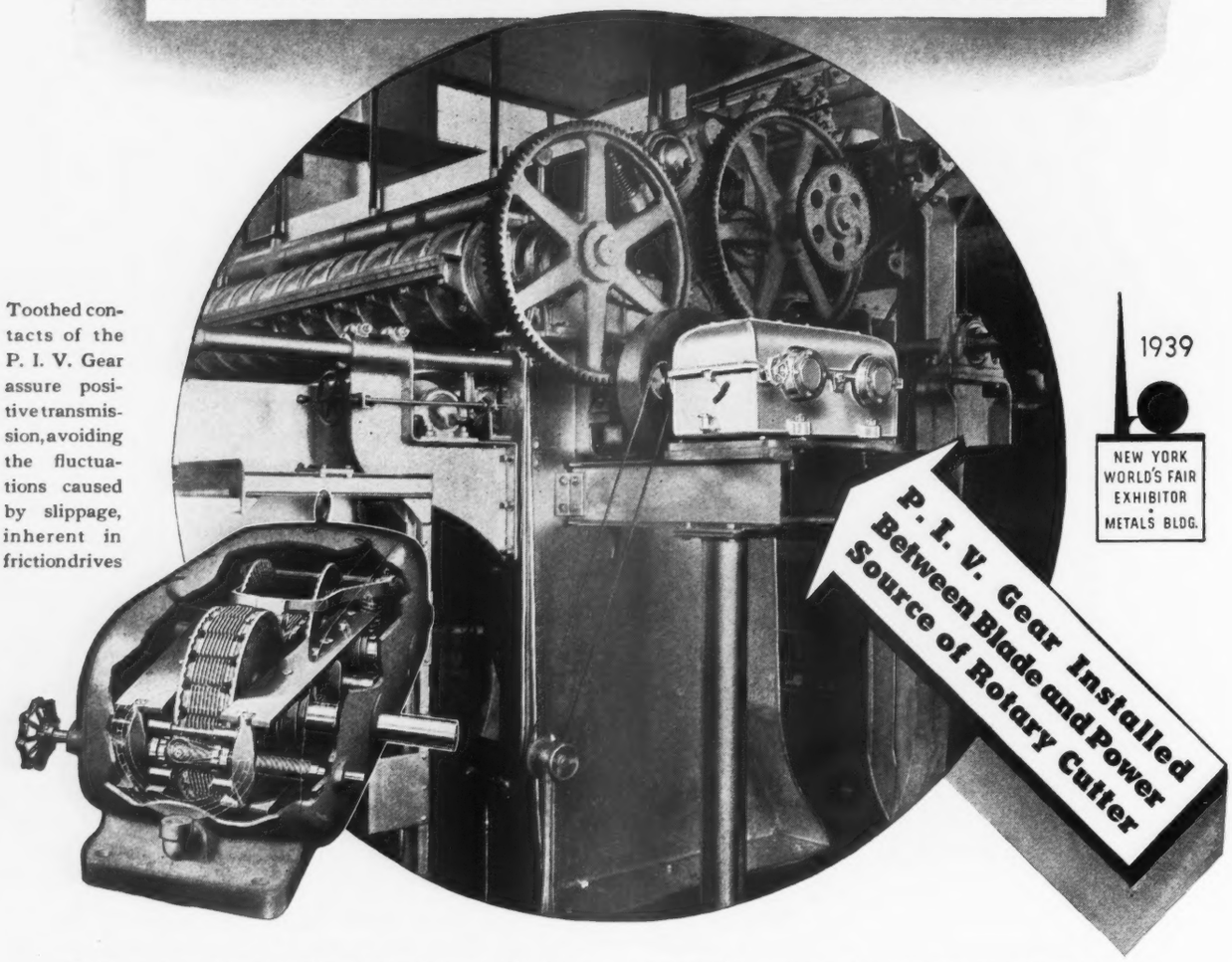
These and other important construction features explain why Goodrich V-Belts last longer, require less attention, reduce shutdowns, increase plant efficiency and cut power costs. Goodrich V-Belts are available everywhere. Call your Goodrich Distributor and *save money*. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

Design Problem in Accurately Synchronized Speeds

Solved with P.I.V. GEAR



Toothed contacts of the P. I. V. Gear assure positive transmission, avoiding the fluctuations caused by slippage, inherent in friction drives

● To cut various length sheets from a 152 inch wide ribbon of pulp coming out of a vacuum dryer at a production rate of 175 to 220 ft. per min. requires accurate synchronization of the cutter speed with the dryer speed.

In the Beloit rotary paper cutter pictured above, designed for this job, the speed of the revolving cutter bar is accurately controlled by a P. I. V. Gear. The cutter bar is mounted on a drum, slightly wider than the 152 inch sheet, so that with the known radius of the cutting edge the length of the sheet will be determined by the relative peripheral speed of the cutter bar and the speed of the pulp.

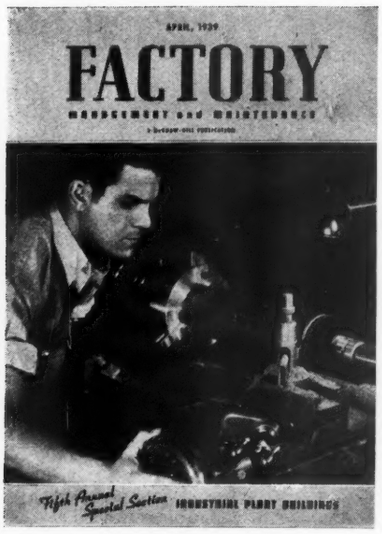
The P. I. V. Gear installed between the cutter and power source gives the necessary synchronization of cutter speed and dryer speed for any length of sheet at desired production rate. This is done quickly, positively, and simply with no more attention than the turning of a hand wheel which is in this case conveniently located on the machine floor.

LINK-BELT P.I.V. GEAR SPEED VARIATOR

An all-metal, compact unit, available for horizontal or vertical mounting, hand or automatic control, the P. I. V. Gear offers you an opportunity for achieving simple, accurate, quick (within a fraction of a revolution) speed control. With the P. I. V. Gear you build into your machine the versatility needed to meet today's varying production requirements. Send for Book No. 1574.

Link-Belt Company, Philadelphia, Indianapolis, Chicago, Atlanta, San Francisco, Toronto. Offices in principal cities. 7658

LINK-BELT POSITIVE DRIVES INCLUDE



FOR THIS MONTH'S full-color cover photograph FACTORY went to the Oaks, Pa., plant of Synthane Corporation, chose a simple machining operation. The golden-yellow material the operator is working on is Bakelite laminated, which Synthane manufactures in sheets, rods, and tubes. The picture was taken by a McGraw-Hill staff photographer, is the fourth in the series planned by FACTORY for 1939.

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A McGRAW-HILL PUBLICATION

FACTORY

MANAGEMENT and MAINTENANCE

APRIL, 1939

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Exide-Ironclads . . .

for more and better material handling at lowest possible cost

BY speeding up your electric industrial truck, you'll get a greater return from your truck investment. Let Exide analyze the job. Or . . . if you measure your truck's battery compartment, we can tell you in a few minutes how large an Exide-Ironclad can be installed and how much more work that truck will be capable of doing.

In addition to the MVM and TLM Exide-Ironclads, Exide has the oversize Types MEH and FLM. They are so assembled that they give you the maximum capacity and power for the battery compartment of every make and type of truck.

Because of the way steel trays save space, it is often possible with these new Exides to install, not only an oversize battery, but in many cases two and three extra cells. Thus the truck is enabled to do more work, and to do it at higher speeds. If faster speed or more work from your trucks is needed or helpful, you can get it with one of the new Exides.

For use on all makes of trucks, there is the new Exide Discharge Indicator, which helps to eliminate "afternoon" fatigue and to keep trucks moving at excellent speed throughout the day's operation. For the charging panel, there is the Exide Charge Control Unit that makes the recharging of batteries simply a matter of turning a knob. Write for full details on these important developments, and get the facts on how to get more and better material handling.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

From Coast to Coast

THEY ARE BUYING THE *New* "1939"

TRADE AUTOMATIC MARK
CENTER CONTROL FORK TRUCK

The list of users is rapidly growing—

Already in a comparatively short time the New "AUTOMATIC" *Center-Control* Fork Truck has won wide acceptance from COAST TO COAST as the New Leader in Industrial Fork Trucks.

As illustrated here, Industries everywhere are using these New "AUTOMATICS" successfully, profitably as New CO-ORDINATED systems for GREATER VOLUME Transportation and LARGER UNIT LOAD storage . . . with the highest degree of EFFICIENCY and SAFETY to MEN and EQUIPMENT.

Each UNIT LOAD with this NEW "AUTOMATIC" is a PAYLOAD . . . Each TRIP is an economical TRIP, from RECEIVING to STORAGE to PROCESS back again to STORAGE or SHIPPING.

Each STORAGE operation with this New "AUTOMATIC" REDUCES HANDLING COSTS. Commodities do not require rehandling—the UNIT LOAD is simply hoisted—stacked double or triple to use ALL available storage space right up to the ROOF TRUSSES.

What these New "AUTOMATICS" are accomplishing for these customers they no doubt can do for YOU too. So write today for the New Bulletin No. 5483. Get the complete facts about this New "AUTOMATIC," the only Industrial Truck with all the "ALL-STAR" Features.

- New Mechanical Units
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- Center Pivoted Trail Axle
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- Dynamic Fork Speed Control
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- All-Welded Frame
- Compact Design
- Low Center of Gravity
- Solid Machined Uprights
- Special Lift Chains

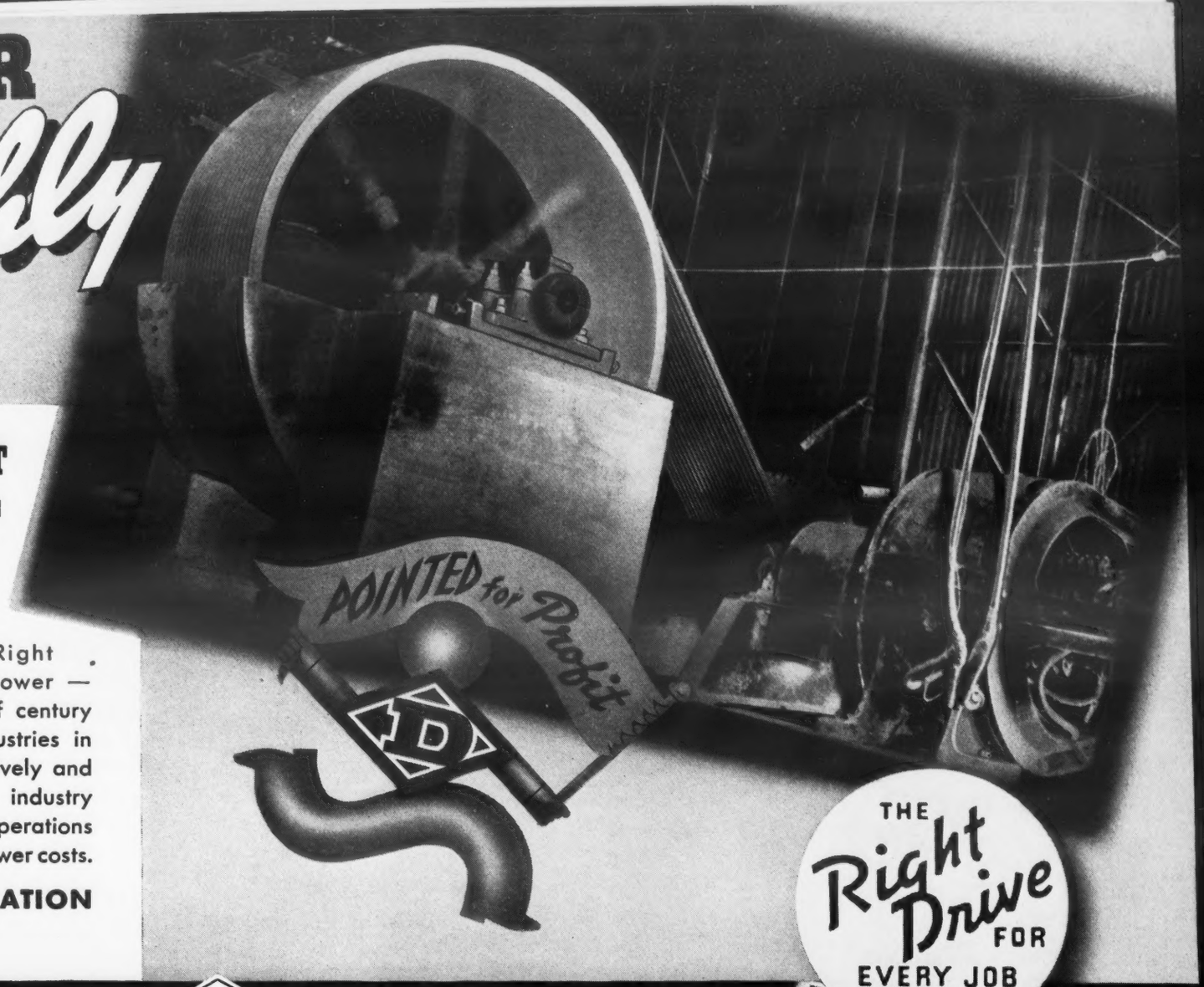
Remember, too, "There is an 'AUTOMATIC' Model to Serve Every Intra-Plant Transportation and Material Handling Problem."

AUTOMATIC TRANSPORTATION CO.

39 W. 87TH STREET — Div. of the Y. & T. Mfg. Co. — CHICAGO, ILLINOIS

"Ship **ON PALLETS**" . . *Save* **TIME** . . *Aid* **LABOR** . . **CUT COSTS WITH** *New* "**AUTOMATICS**

when POWER moves -- Smoothly



PRODUCTION and PROFITS MOUNT

This "D-V" Drive saved the cost of a new and expensive motor for a large cement mill. It is only one of many examples of important economies effected in this plant through the joint effort of plant executives and Dodge engineers . . . Equip your power-paths with "The Right Drive for the Job" — it means free flowing power — specify Dodge Drives . . . For more than a half century Dodge engineers have cooperated with all industries in the study and improvement of methods for effectively and economically transmitting power . . . In every industry Dodge power drive units are serving to make operations smoother, and their performances are reflected in lower costs.

DODGE MANUFACTURING CORPORATION
MISHAWAKA, INDIANA, U. S. A.

THE Right Drive FOR EVERY JOB

Think of **DODGE** MISHAWAKA

. . . when planning a new plant . . . when adding a new department . . . when installing new machinery . . . when modernizing old equipment . . . when designing new products.

Send for this book — "Pointing for Profit" —it will suggest many profitable applications of Dodge Drives.

TAKE YOUR CHOICE!

• It doesn't take long for a worn-out or inefficient floor brush to waste $20 of a sweeper's time. A new Osborn Brush selected to meet job conditions may cost only $2.

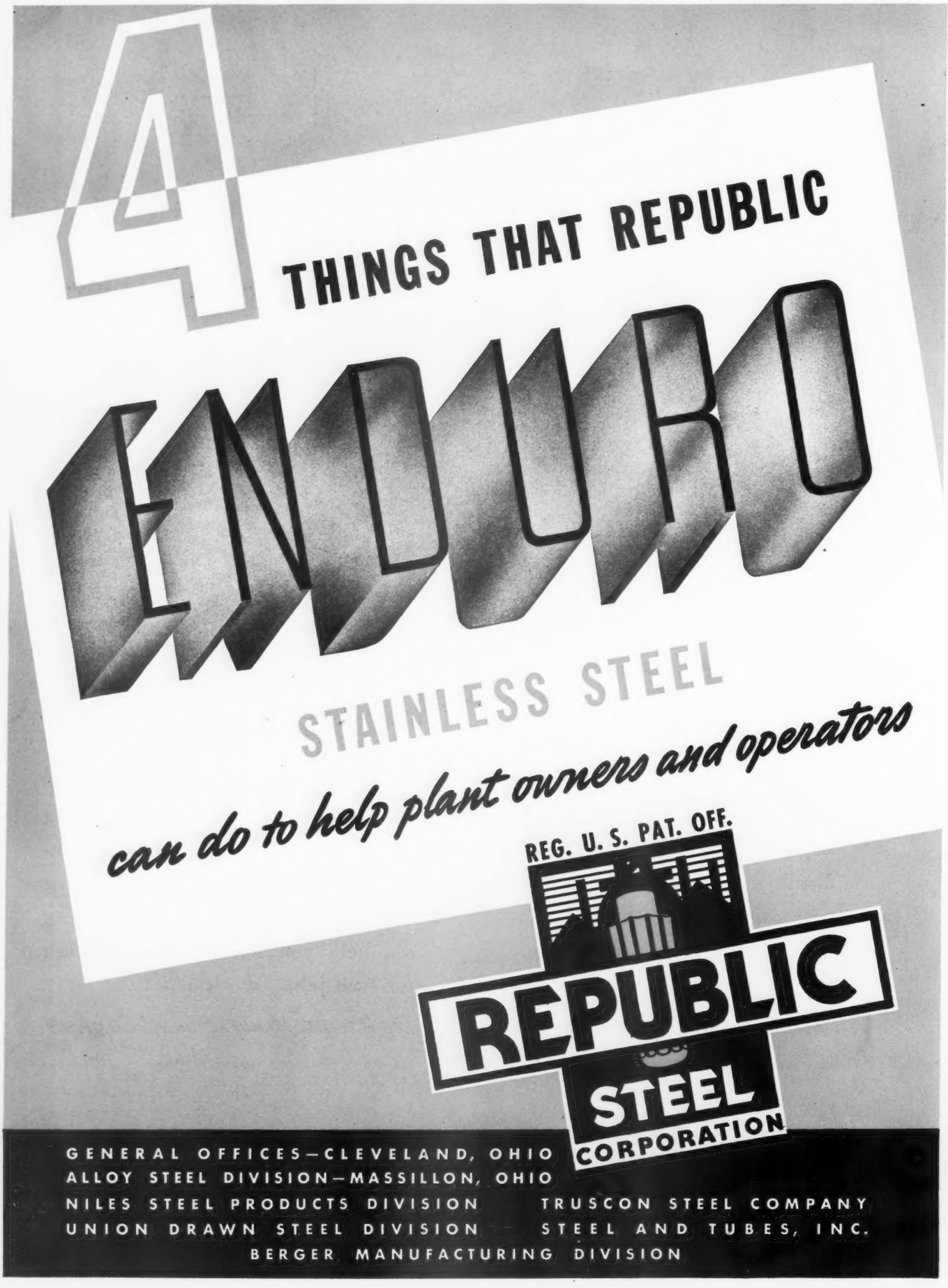
How many brushes are wasting "wage-money" in your plant, either because they have outlived their efficiency or because they never were correctly matched to job conditions?

Standard Osborn Brushes cover a wide scope of production and maintenance brush needs. Osborn and the Osborn Distributor in your locality can help you select the right brush for each job. *Ask about it!*

THE OSBORN MANUFACTURING COMPANY
5401 HAMILTON AVENUE • CLEVELAND, OHIO
Sales Offices: New York • Detroit • Chicago • San Francisco

OSBORN Osborn Brushes

PROTECT THOSE HOURS SPENT WITH BRUSHES


4
THINGS THAT REPUBLIC
ENDURO
STAINLESS STEEL
can do to help plant owners and operators
REG. U. S. PAT. OFF.
REPUBLIC
STEEL
CORPORATION
GENERAL OFFICES—CLEVELAND, OHIO
ALLOY STEEL DIVISION—MASSILLON, OHIO
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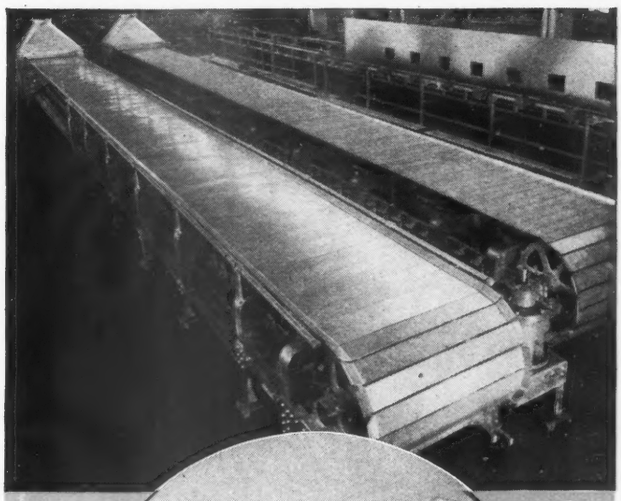
BERGER MANUFACTURING DIVISION
TRUSCON STEEL COMPANY
STEEL AND TUBES, INC.

Give you better
PLANT EQUIPMENT

Eleven tons of Republic ENDURO* in these conveyor inspection tables represent the ultimate in sanitation in this modern meat packing plant. They will last many, many years and save their cost in reduced maintenance and cleaning expense.

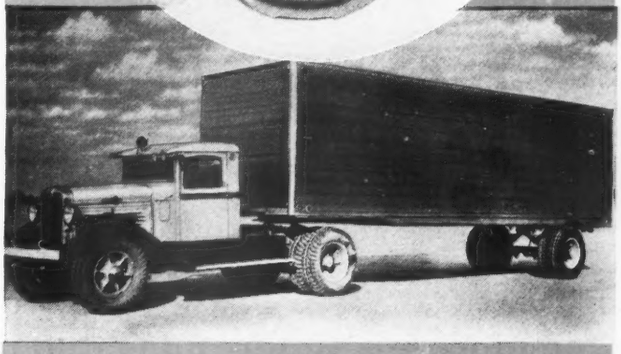


Make a better
MORE SALABLE PRODUCT

A dime will buy an orange reamer. But the maker of this motor-driven reamer dressed it up in ENDURO stainless steel, made it so beautiful that people wanted it, and sells it for dollars—not dimes.

Point the way to
LOWER DELIVERY COSTS

This delivery unit of welded ENDURO weighs just 3000 pounds less than the one it replaced. That's 1½ tons easier on the gasoline tank and the tires—to say nothing of its faster running time.



Make for harmony in
EMPLOYEE RELATIONS

A clean cafeteria of sparkling ENDURO is an asset to any industrial plant. It affords 30 minutes of pleasant relaxation, builds morale and stamps the management as definitely unselfish and progressive.

*Reg. U.S. Pat. Off.

SPECIFY REPUBLIC STEELS
for your product and when buying plant equipment

Black and galvanized steel, copper bearing steel and rust-resisting Toncan* iron pipe.

Black, galvanized and galvannealed steel, copper bearing steel and Toncan iron sheets.

Plates—bars—cold drawn standard and special sections—alloy steels—rail carbon tubing.

Bolts—nuts—rivets—turnbuckles—nails—wire and wire fencing—steel fence posts.

WHEN YOU BUY 600-W

Be Sure It's

Remember — 600-W designates Gargoyle Cylinder Oil 600-W — made by Socony-Vacuum only.

It's the most famous oil brand of its type. Its strong oil film resists wear and corrosion of liners... seals pistons... prevents steam leakage.

The use of Gargoyle 600-W results in low costs for power, lubrication, maintenance — A Lubrication Profit for You!

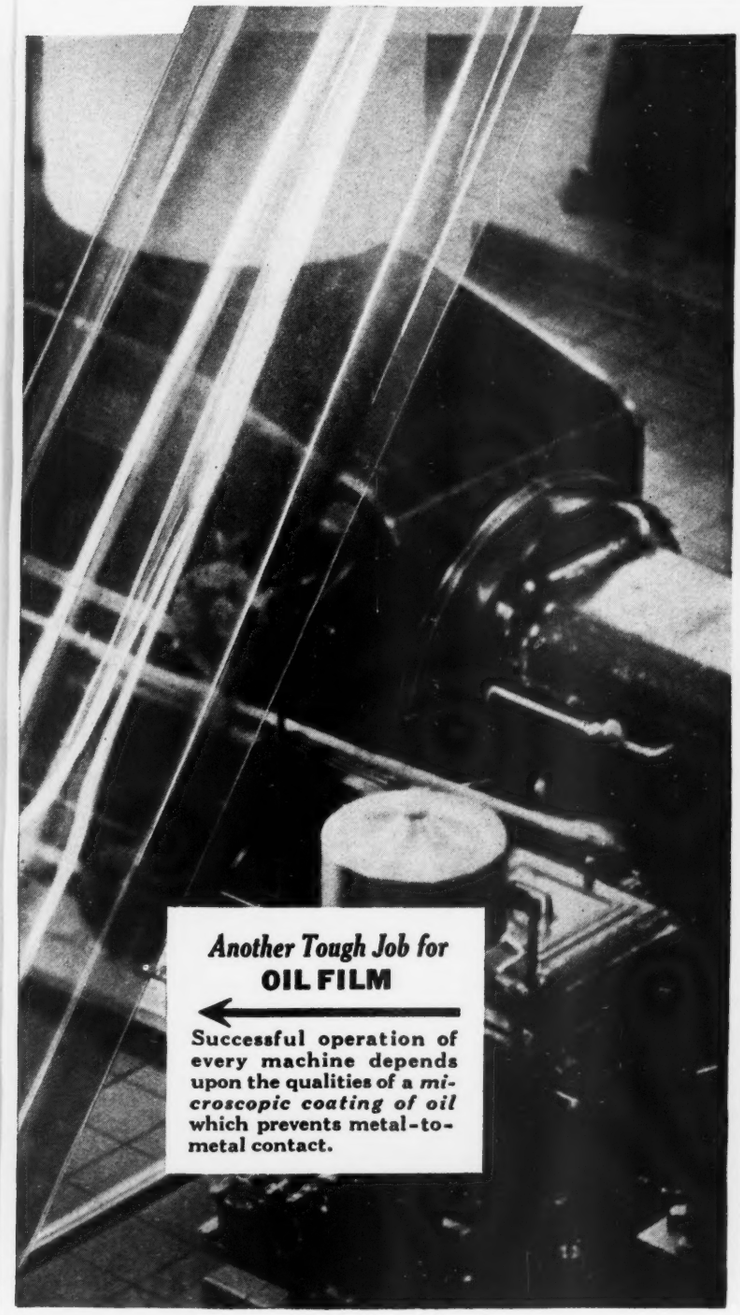
THE SOCONY-VACUUM man offers you a complete line of lubricants, plus these *exclusives:*

The right lubricant for every machine . . . and new lubricants ahead of new needs . . . developed by world-famous research laboratories through close cooperation with machine builders.

73 years' experience — thousands of case histories — to guide in prescribing the right use of these lubricants to gain Lubrication Profits for you.

World-wide distribution and guaranteed uniformity — the same quality available everywhere.

CYLINDER OIL GARGOYLE!

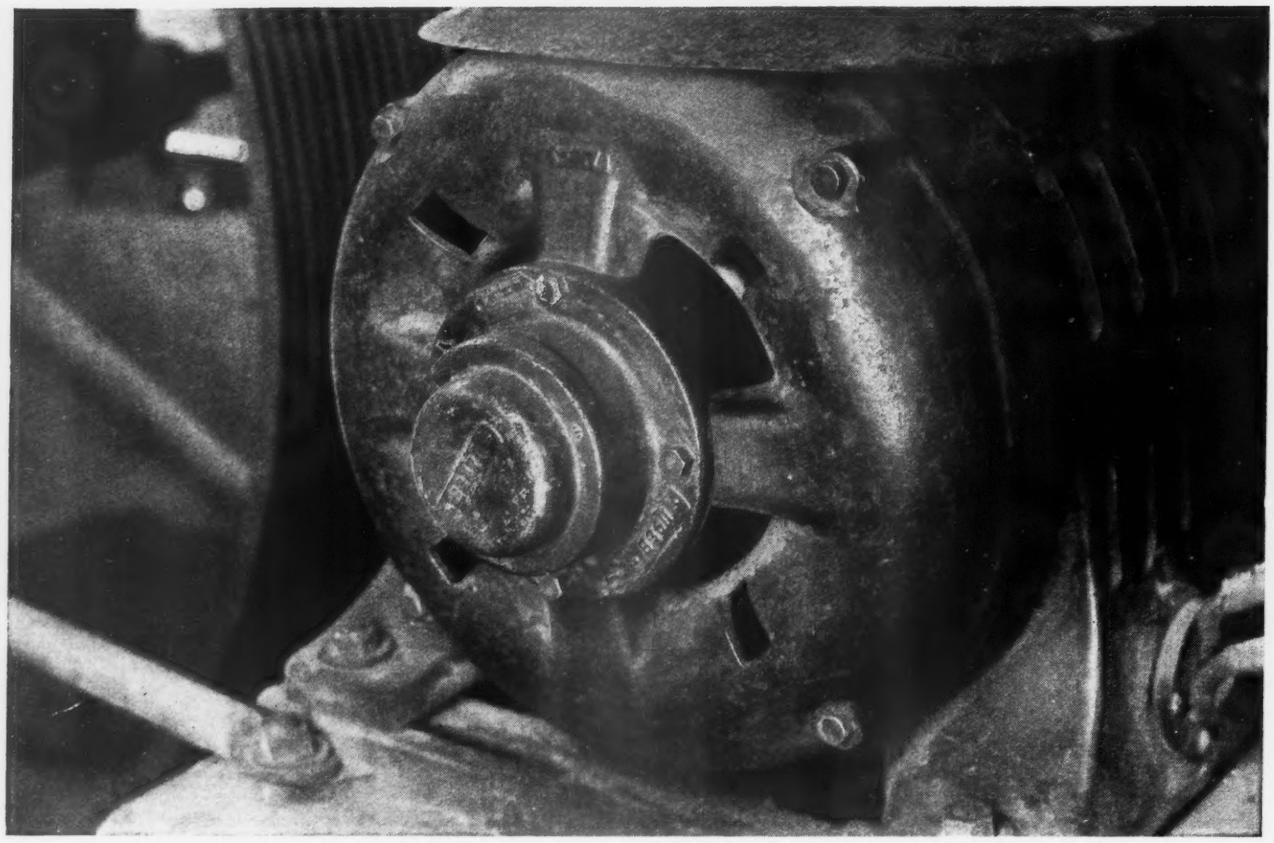

Another Tough Job for
OIL FILM
Successful operation of every machine depends upon the qualities of a *microscopic coating of oil* which prevents metal-to-metal contact.

SOCONY-VACUUM

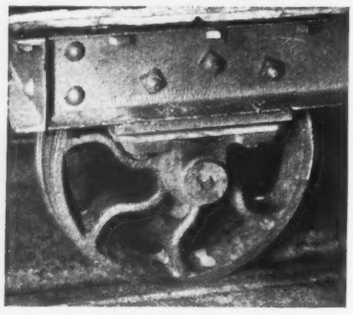
Industrial Service and Lubricants Help to Lower Costs by

Correct Lubrication

GARGOYLE Lubricants



"SAVES $100 A YEAR ON ONE MOTOR ALONE!"



SAME SHOP

Axle bearings on the flat trucks in the sand blast room were "eaten" away by flying sand. Replacements came thick and fast.

Standard Fafnir Pillow Blocks were substituted in February 1937. Six out of eight original bearings still in active service. Although exposure to sand blast has polished the housings, bearings still operate satisfactorily.

Any shop like the St. Louis Steel Casting Company's is tough on bearings. Flying sand, dust and dirt are ever present. The motor illustrated drives a machine for handling molding sand. Previous to the installation of this Fafnir Ball Bearing Motor Cartridge, bearing life averaged only four months. A spare motor was always at hand for replacement. The motor cartridge saved all this; no replacement in sight yet. Saving? $100 per year.

Let Fafnir work with you in cutting bearing replacement costs — improving the operation of every bearing. Fafnir offers a complete line of standard and special units. The Fafnir Bearing Company, New Britain, Conn., Los Angeles, San Francisco, Seattle.

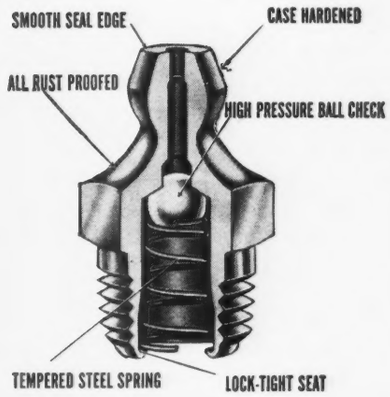
FAFNIR BALL BEARINGS

THE BALANCED LINE • MOST COMPLETE IN AMERICA

NOT A SINGLE BEARING FAILURE

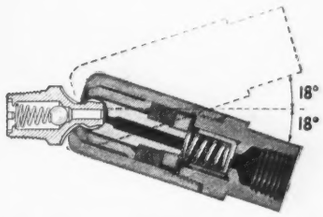
SINCE ADOPTING

ALEMITE



THE ALEMITE HYDRAULIC FITTING—THERE'S NO OTHER LIKE IT

When you choose Alemite Hydraulic Fittings to safeguard important bearings, you are getting the best, most dependable fitting that has yet been made. Case-hardened to resist breakage—cadmium-plated to resist rust—every fitting individually inspected and tested! Accurately engineered by the originators of pressure lubrication to give your machines maximum protection!



HERE'S HOW HYDRAULIC GUN WORKS ON HYDRAULIC FITTING

See how the coupling of the Alemite Hydraulic Gun grips the nose of the Alemite Hydraulic Fitting to form a leakproof seal—a seal which grows tighter as pressure is increased! Gun may be arced as much as 18° in any direction without breaking the seal, for greater convenience in reaching remote bearings.

BIG BREWERY FINDS ALEMITE GUNS AND LUBRICANTS MEET EVERY SPECIALIZED NEED

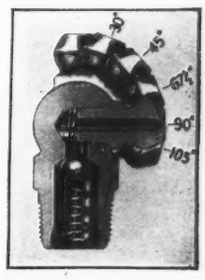
"Write your own ticket—I'll sign it!" That's what Superintendent Joseph L. Carney told us when we asked about the use of Alemite Guns and Lubricants in the big plant of the Narragansett Brewing Company, Cranston, Rhode Island.

They've used Alemite Guns and Alemite Lubricants for more than eight years, *without a single bearing failure!* There's a battery of 8 O. & J. Liquid Carbonic Labelers—a battery of rotary improved filling machines—a mammoth Liquid Carbonic Pasteurizer (*where a bearing failure would hold up the whole brewery's production*)—a refrigerating machine which formerly suffered from frequent bearing failures—and a Super-Kleen Liquid Carbonic Washer.

All these machines get Alemite Lubricant from Alemite Guns. Some of the bearings are exposed to 140° water. Others present unusual problems of many kinds. But ALL these bearings are perfectly safeguarded by Alemite Lubrication. *Every specialized need is successfully answered.* Let Alemite Guns and Lubricants meet *your* specialized lubrication needs—cut lubrication costs, save time, protect important bearings! Write to us for specific recommendations!

HYDRAULIC FITTINGS AVAILABLE IN ANGLES

Alemite Hydraulic Fittings are made in all desired angles to facilitate the lubrication of remote bearings, and are cyanide hardened to stand up under severe use over a long period of time. Every fitting must stand rigid factory inspection before shipment.



ALEMITE HYDRAULIC GUN
MODEL 5586

Holds 9 oz. semi-solid lubricant; quickly filled through filler-type handle with Alemite Filler Tank; easily operated with one hand—can't slip off fitting. Delivers predetermined quantity of lubricant at each shot; up to 10,000 lbs. pressure per sq. in. Gun coupling has three jaws which grasp fitting on contact, forming leakproof seal.

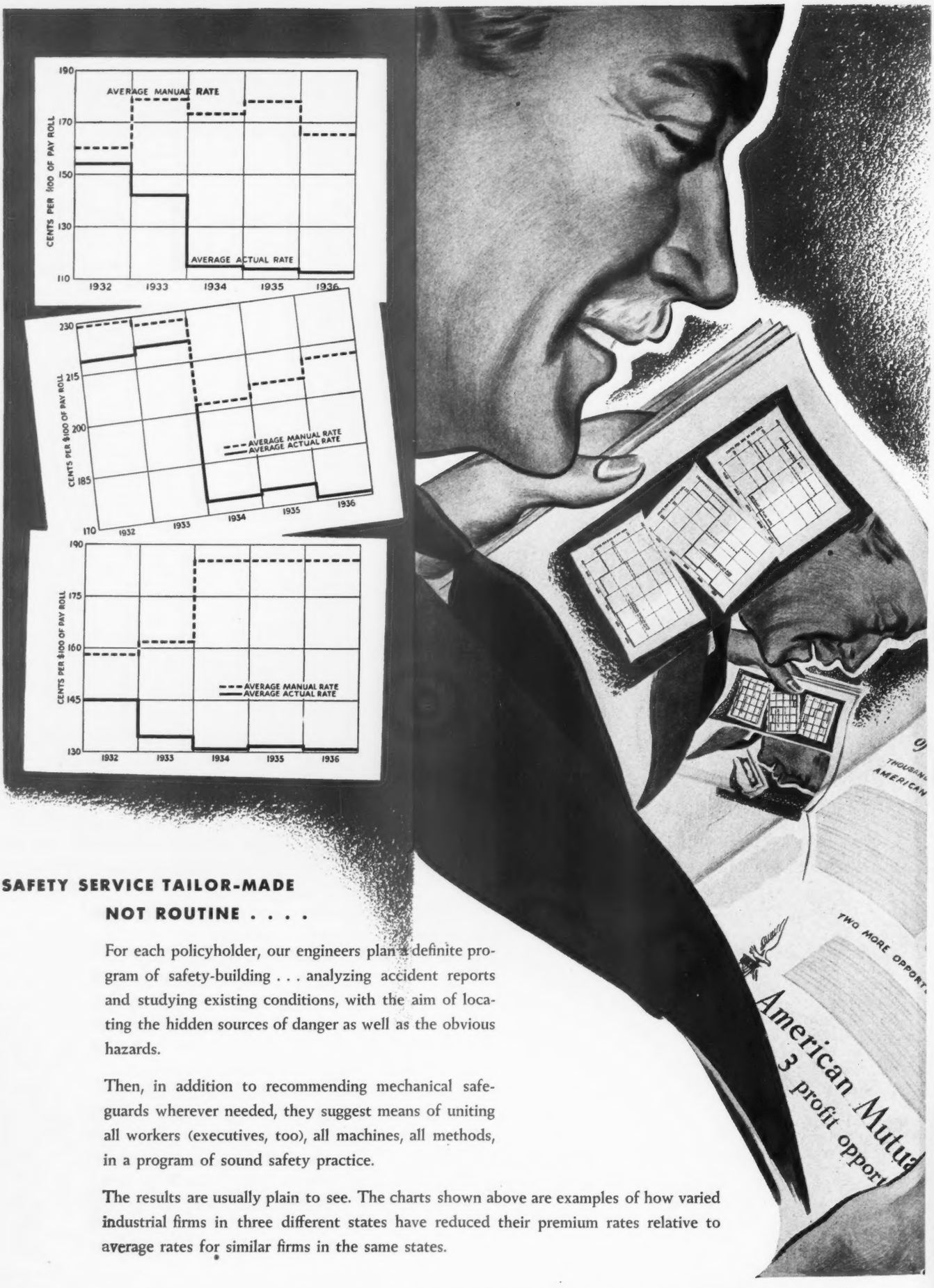
ALEMITE

REG. U. S. PAT. OFF.

A Subsidiary of Stewart-Warner Corporation—1870 Diversey Parkway, Chicago, Ill.

Stewart-Warner-Alemite Corporation of Canada, Ltd., Belleville, Ontario

WORLD'S LARGEST MANUFACTURER OF LUBRICATION PRODUCTS



SAFETY SERVICE TAILOR-MADE NOT ROUTINE . . . .

For each policyholder, our engineers plan a definite program of safety-building . . . analyzing accident reports and studying existing conditions, with the aim of locating the hidden sources of danger as well as the obvious hazards.

Then, in addition to recommending mechanical safeguards wherever needed, they suggest means of uniting all workers (executives, too), all machines, all methods, in a program of sound safety practice.

The results are usually plain to see. The charts shown above are examples of how varied industrial firms in three different states have reduced their premium rates relative to average rates for similar firms in the same states.

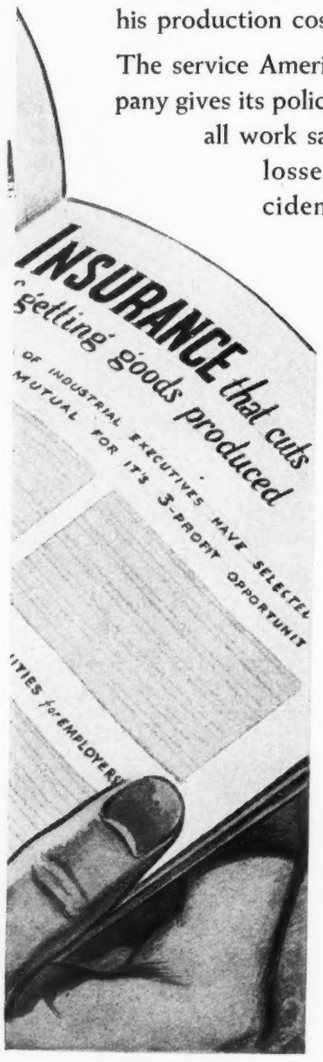
INSURANCE *that cuts the cost of getting goods produced*

THOUSANDS OF INDUSTRIAL EXECUTIVES HAVE SELECTED AMERICAN MUTUAL — FOR IT'S 3-PROFIT OPPORTUNITY

Any kind of workmen's compensation insurance you might take out, should pay the claims of your employees for injuries received on the job. But employees are not the only victims of industrial accidents. Another is the employer's production schedule—and another is his production cost.

The service America's first liability insurance company gives its policyholders, works not only to make all work safe, but also helps to prevent the losses in time and money that accidents cause. Wherever the frequency and severity of accidents are reduced — *there* the gears of the plant's operations *must* mesh more smoothly.

Even accidents where no one is hurt—we try to forestall . . . by searching out *all* the fundamental accident sources . . . by aiming, economically, toward having all operations follow the *habit* of sound safety practice. Result is reduction in accidents that upset schedules, damage machinery, injure morale as well as workers. And often a saving in lowered insurance costs as reward for the improvement in accident experience.



TWO MORE OPPORTUNITIES *for* EMPLOYERS *to* PROFIT

American Mutual offers two other opportunities for employers to profit from the insurance that benefits their employees:

Our specialized medical service can often restore to their jobs workers whom it would be costly to replace.

Every year since 1887, each policyholder has received from American Mutual a dividend of 20% or more of insurance cost—a grand total of extra profit to industry of over $63,000,000.

These two other profit opportunities are discussed more fully in the booklet, "How Twelve Companies Saved More Than A Million Dollars" Address 142 Berkeley St., Dept. C-2, Boston, Mass.

1887

American Mutual

works to make all work safe

AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

American Mutual has branches in 57 of the country's principal industrial centers. In addition to Workmen's Compensation, it offers opportunity for savings on Automobile, Fidelity Bond, and practically all other lines of liability insurance.

Admitted Assets: $38,330,807.44 Liabilities: $32,365,700.56
Surplus to Policyholders: $5,965,106.88 As of Dec. 31, 1938

Savings even greater than 20% have been regularly made on Fire Insurance, written by our associate, Allied American Mutual Fire Insurance Co.

MORE PLANT EXECUTIVES ARE ASKING THIS QUESTION EVERY DAY

"Can WE make further operating savings through *improved lubrication?*"

An experienced GULF *engineer will help* YOU *find the answer . . .*

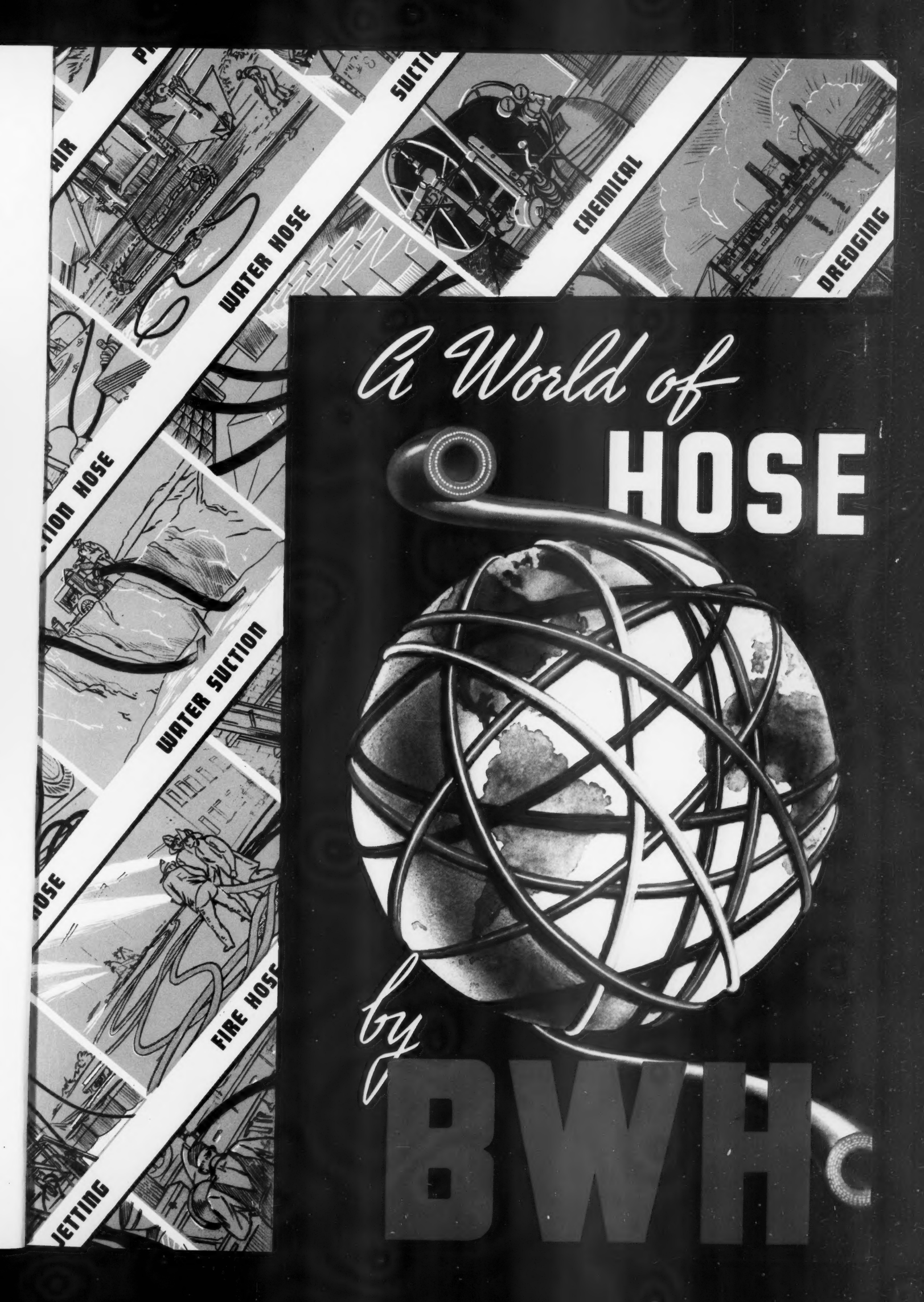
"WHEN our management demanded a further reduction in operating expense, we decided the saving had to come from maintenance costs," says this plant superintendent. "So we called in the Gulf engineer—and he is helping us secure the economies we need."

Scores of plant managers are reducing their operating expenses every day through improved lubrication with Gulf's *higher quality* oils and greases. The Gulf engineer is a thoroughly trained and widely experienced lubrication expert who has the knack of working tactfully with operating men. Because he knows what type of lubricants best provide for the conditions under which machines must work, he is prepared to recommend the proper application of oils and greases which contribute most to efficient machine operation.

With friction and wear reduced to a minimum, power bills come down and maintenance expense is reduced. After Gulf's higher quality lubricants are placed in service, it is not uncommon for plant managers to report savings *in maintenance alone* amounting to many times the total annual bill for lubricants.

So we suggest that you ask this question of the Gulf engineer when he calls, "Can we make further operating savings through improved lubrication?" He can help you find the answer. Gulf Oil Corporation—Gulf Refining Company, Gulf Building, Pittsburgh, Pa.

GULF INDUSTRIAL LUBRICATION


AIR
WATER HOSE
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A World of
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by
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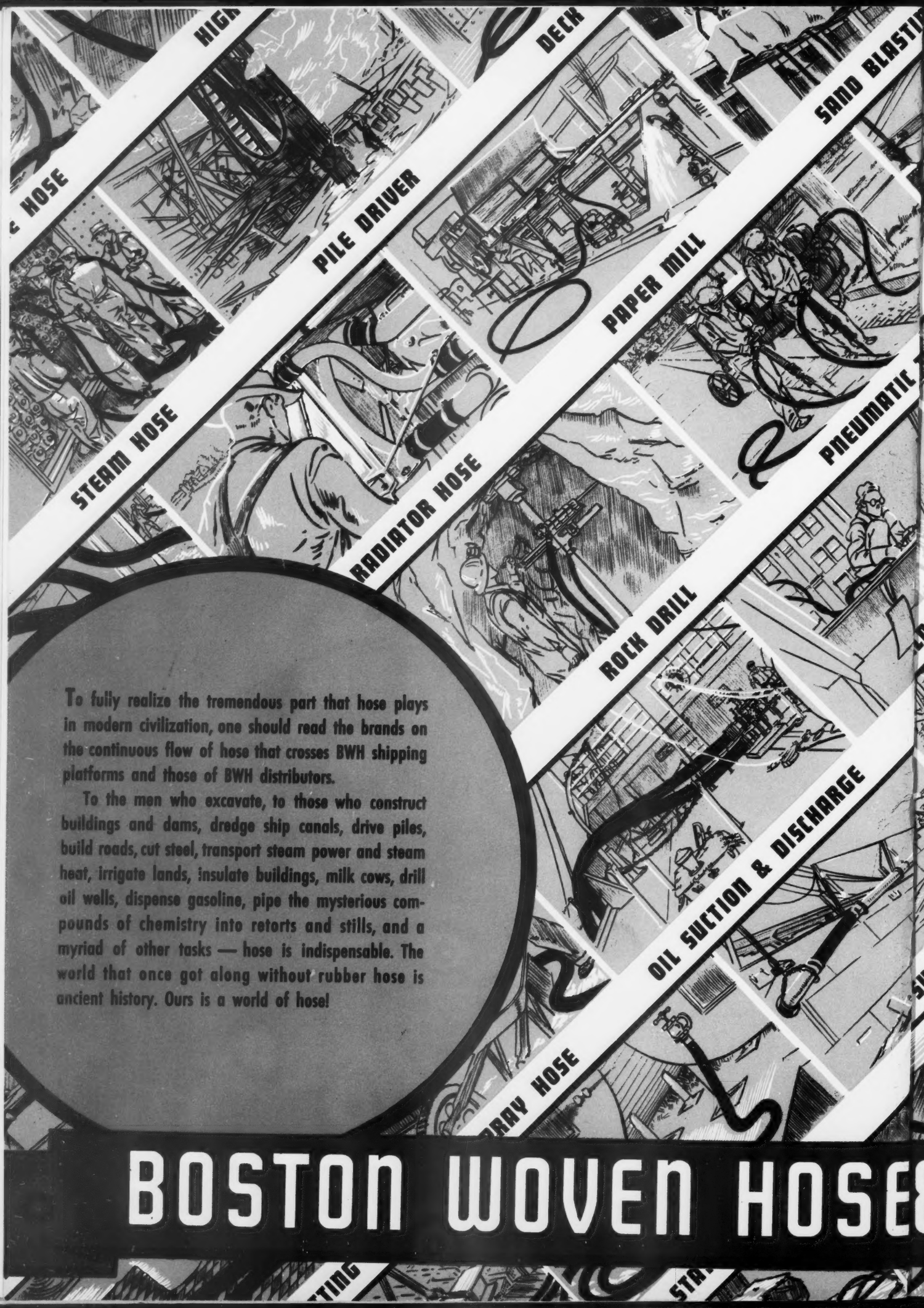
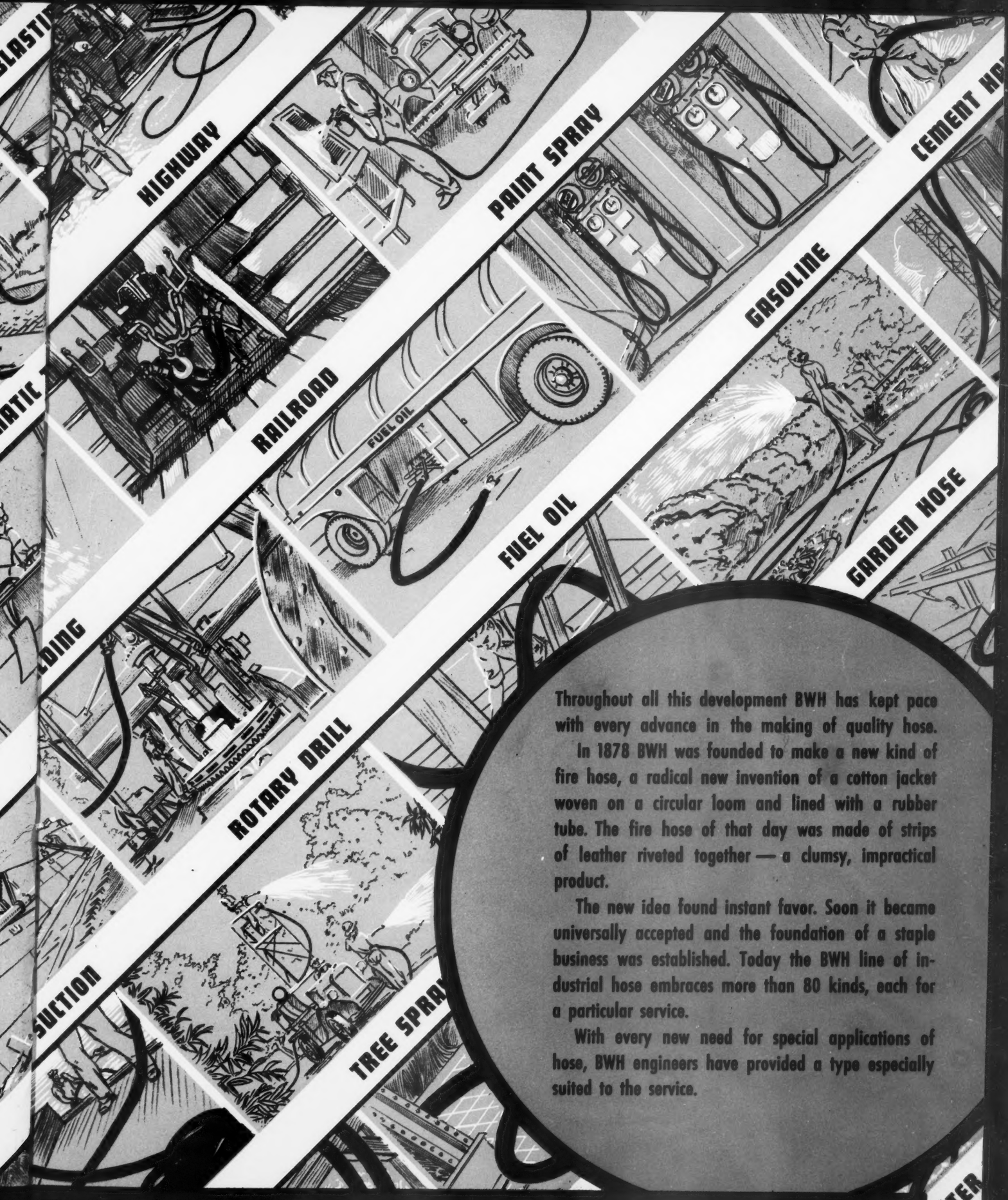


To fully realize the tremendous part that hose plays in modern civilization, one should read the brands on the continuous flow of hose that crosses BWH shipping platforms and those of BWH distributors.

To the men who excavate, to those who construct buildings and dams, dredge ship canals, drive piles, build roads, cut steel, transport steam power and steam heat, irrigate lands, insulate buildings, milk cows, drill oil wells, dispense gasoline, pipe the mysterious compounds of chemistry into retorts and stills, and a myriad of other tasks — hose is indispensable. The world that once got along without rubber hose is ancient history. Ours is a world of hose!

BOSTON WOVEN HOSE



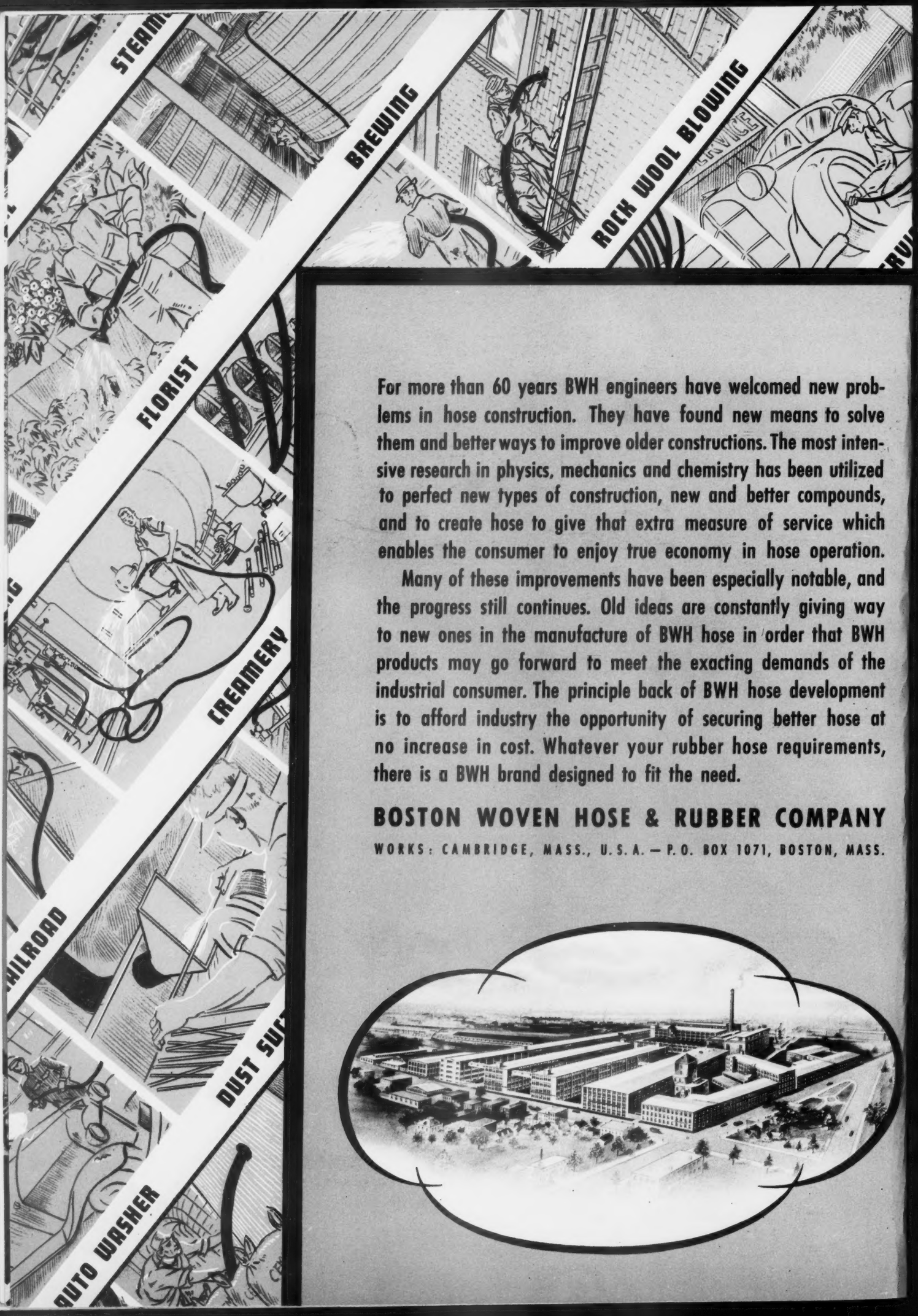
Throughout all this development BWH has kept pace with every advance in the making of quality hose.

In 1878 BWH was founded to make a new kind of fire hose, a radical new invention of a cotton jacket woven on a circular loom and lined with a rubber tube. The fire hose of that day was made of strips of leather riveted together — a clumsy, impractical product.

The new idea found instant favor. Soon it became universally accepted and the foundation of a staple business was established. Today the BWH line of industrial hose embraces more than 80 kinds, each for a particular service.

With every new need for special applications of hose, BWH engineers have provided a type especially suited to the service.

EE RUBBER COMPANY



For more than 60 years BWH engineers have welcomed new problems in hose construction. They have found new means to solve them and better ways to improve older constructions. The most intensive research in physics, mechanics and chemistry has been utilized to perfect new types of construction, new and better compounds, and to create hose to give that extra measure of service which enables the consumer to enjoy true economy in hose operation.

Many of these improvements have been especially notable, and the progress still continues. Old ideas are constantly giving way to new ones in the manufacture of BWH hose in order that BWH products may go forward to meet the exacting demands of the industrial consumer. The principle back of BWH hose development is to afford industry the opportunity of securing better hose at no increase in cost. Whatever your rubber hose requirements, there is a BWH brand designed to fit the need.

BOSTON WOVEN HOSE & RUBBER COMPANY

WORKS: CAMBRIDGE, MASS., U.S.A. — P.O. BOX 1071, BOSTON, MASS.

3800 firms have already inquired about this new ALTERNATING CURRENT polyspeed MOTOR

At the Precision Grinding Wheel Co. in Philadelphia, the testing of grinding wheels is controlled by Polyspeed Motors.

(Left) Regulator handle changes the speed electrically. (Right) With the preset head, push button control selects fixed speeds.

ADJUSTABLE SPEED

When adjustable-speed motors are required, consult Crocker-Wheeler. A great deal of experience is at your service—long years of building D.C. adjustable-speed motors (speed adjusted by field control or by voltage control); of building slip-ring, variable-speed motors, or squirrel-cage multispeed motors. The addition of the A.C. *Polyspeed* Motor places us in position to make unbiased recommendations for any application. *If you have an adjustable-speed problem, consult Crocker-Wheeler.*

Here is 1939's answer to the problem of adjustable motor-speed control. The rightness of the Crocker-Wheeler *Polyspeed* Motor was instantly recognized. From the appearance of only one advertisement, in a list of business papers, 3800 firms wrote in for "the full details immediately."

We would like to send them to you, too. Meantime, here are the high spots . . . *Polyspeed* is an adjustable-speed motor for operation on alternating current; built in 1, 2, 3, 5 and 7½ horsepower sizes—for 220, 440 or 550 volts; 3 phase, 60 cycle operation . . . *Polyspeed* provides fully continuous speed regulation—with no rheostat losses; high starting torque—300 or 400%, if desired; regenerative braking; remote and automatic control of speed, if desired.

Polyspeed permits an infinite number of speeds. With hand control—turning the regulator handle changes the speed electrically. Or—with preset head—push button control permits selection among 2 to 6 fixed speeds.

We invite you to write—on your business or professional letterhead—for complete and illustrated data on *Polyspeed* Motors — pioneered by Crocker-Wheeler. And on any of the lines of motors and generators listed below—or on flexible couplings—we would also welcome your inquiry.

CROCKER-WHEELER

POLYSPEED MOTORS
1 TO 7½ HP.

DIRECT CURRENT MOTORS
¼ TO 5,000 HP.

POLYPHASE INDUCTION MOTORS
¾ TO 10,000 HP.

SYNCHRONOUS MOTORS
15 TO 10,000 HP.

CROCKER-WHEELER
TRADE MARK REG. U.S. PAT. OFF.

DIRECT CURRENT GENERATORS
UP TO 7,500 KW.

ALTERNATING CURRENT GENERATORS
UP TO 10,000 K.V.A.

MOTOR-GENERATOR SETS
UP TO 7,500 KW.

FLEXIBLE COUPLINGS
UP TO 200 HP.

50 YEARS OF PIONEERING

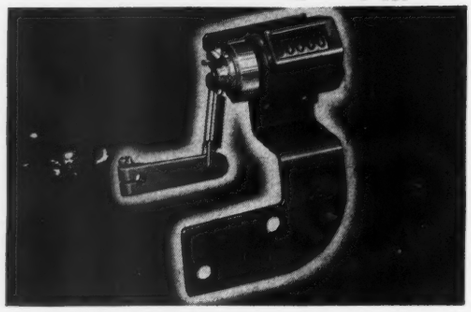
CROCKER-WHEELER ELECTRIC MFG. COMPANY, AMPERE, NEW JERSEY

GET

"Facts-in-Figures"

on both production and office work

from Veeder-ROOT Counting Devices

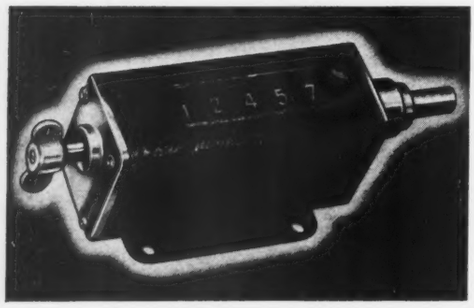


FOR OFFICE & LIGHT PRODUCTION MACHINES

Small Reset Counters count strokes or revolutions. May be furnished with totalizing register.

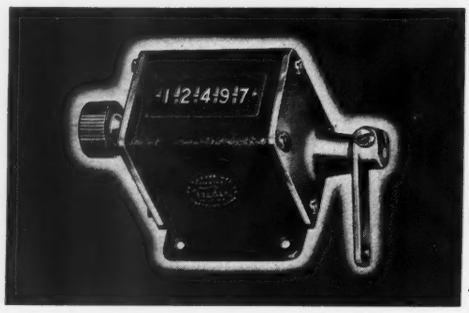
You get *workable information* from Veeder-Root Counting Devices installed on production machines and office appliances. You get accurate records that can be quickly translated into closer control of production, maintenance and wage schedules . . . and into prevention of needless waste.

Veeder-Root Counters tell you at a glance what each machine and operator is doing hourly, daily, weekly . . . in terms of operations, revolutions, strokes, trips, starts, stops, speeds, lengths, volumes, parts, finished products. Or in any other required unit of performance or production. Every machine and process can be accurately checked . . . mechanically, electrically or manually . . . by one of the complete line of Veeder-Root Counting Devices. Write for the booklet, "To Count Is To Control."



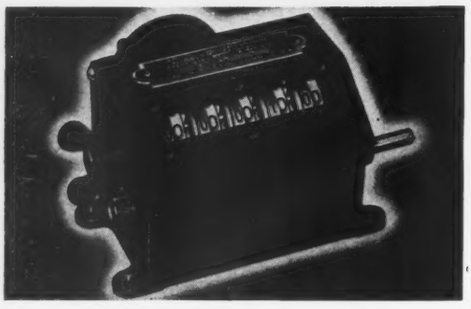
CONTROLS MACHINE RUNS

This Predetermining Counter prevents overruns and shortages on winders, fast automatics, etc., running up to 2500 r. p. m. Shuts down machine when desired.



ACCOUNTING AND TYPING

This Production Computator records each keystroke on typewriters and accounting machines, showing one figure for each 10, 100 or 240 strokes. Provides accurate basis of wage-payment and bonus systems.



FOR HIGH SPEED WORK

This High Speed Resetting Counter operates at 8,000 counts per minute in direct-drive type . . . 2,000 in revolution type. For coil-winding, etc.

Veeder-Root Inc.

HARTFORD, CONNECTICUT

OFFICES IN Boston, Chicago, Cincinnati, Cleveland, Detroit, Greenville, S. C., Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Montreal, Canada, Buenos Aires, Mexico City, London, Paris, Tokio, Shanghai, Melbourne.

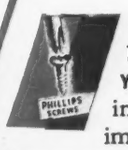
PHILLIPS SCREWS FOR MEN

WHO WANT TO SAVE THEMSELVES TROUBLE

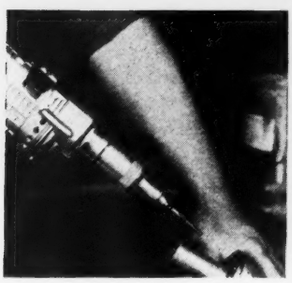
Two years ago, you found Phillips Recessed Head Screws in your new car, last year on your electric refrigerator, your furniture. And this year you see them on your electric razor, your radio cabinet, your lawnmower, your wife's washing machine.

No question about it — industry at large has decided that slotted screws cost too much for the troubles they cause. Put patented Phillips Screws in your plant — like thousands of other manufacturers, you'll find out that *it costs less to use Phillips Screws.*

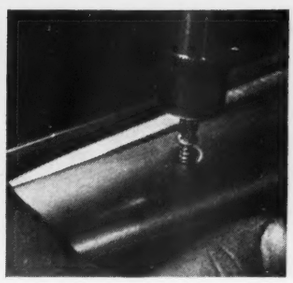
CUT COSTS 50% AND MORE BY ENDING ASSEMBLY TROUBLES



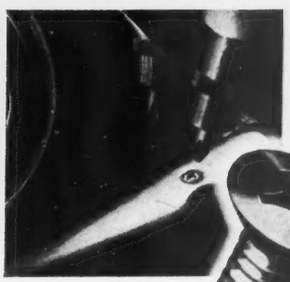
This valuable booklet shows how **YOU CAN MAKE SAVINGS** in assembly cost immediately. Address one of the firms below for free copy.



NO TIME WASTED. The Phillips Recessed Head Screw clings to tapered Phillips driver. No screws fumbled. One-hand driving.



NO SPOILAGE. The driver can't slip from the Phillips recess. Faster driving methods (including power drivers) are safe to use.



REJECTS ELIMINATED. Greatly increased holding power — no loosening in service.

PHILLIPS RECESSED HEAD CAN'T SPLIT. Taper and depth of Phillips recess carefully worked out to utilize driver's *maximum* turning power — without sacrifice of strength in screw head. Flat surfaces — no sharp corners; so no burring. 4 sizes of Phillips Drivers provide greatest efficiency for all Phillips Screw sizes. 2 sizes fit diameters #5 to #16 inclusive.

PHILLIPS *recessed head screws*

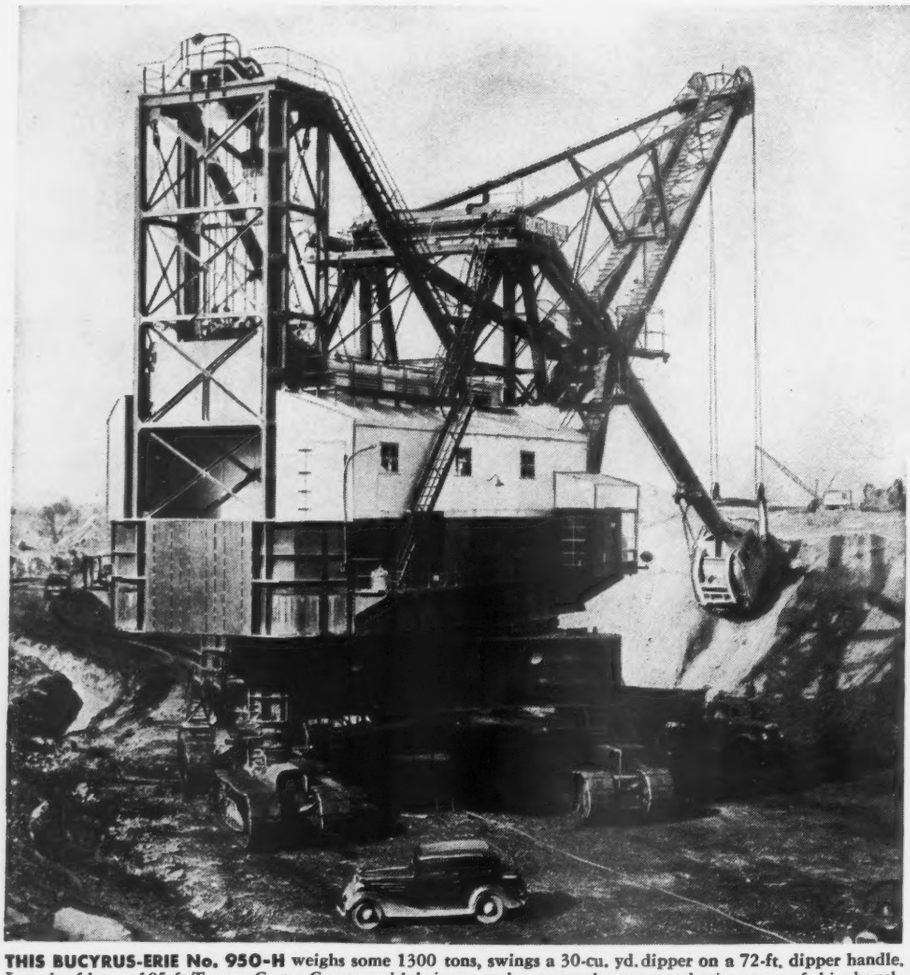
MACHINE SCREWS · SHEET METAL SCREWS · WOOD SCREWS · STOVE BOLTS

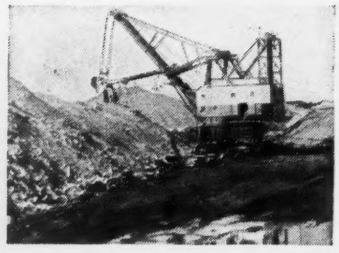
U. S. Pat. on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338

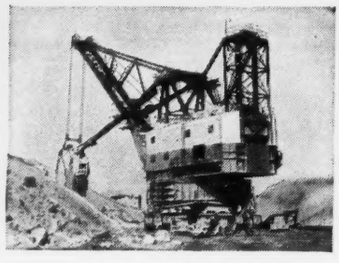
American Screw Co., Licensor
Providence, R. I.
Chandler Products Company.
Euclid, Ohio
Continental Screw Company
New Bedford, Mass.
Corbin Screw Corporation
New Britain, Conn.
The Lamson & Sessions Company
Cleveland, Ohio
National Screw & Mfg. Co.
Cleveland, Ohio
Parker-Kalon Corp., New York, N. Y.
Pheoll Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co.
Port Chester, N. Y.
Scovill Manufacturing Co
Waterbury, Conn.

IT COSTS LESS TO USE PHILLIPS SCREWS

SWINGS 40 TONS EVERY 50 SECONDS







THIS BUCYRUS-ERIE No. 950-H weighs some 1300 tons, swings a 30-cu. yd. dipper on a 72-ft. dipper handle. Length of boom 105 ft. Texaco Crater Compound lubricates and protects the gears and wire ropes of this shovel.

THIS BUCYRUS-ERIE is changing "the lay of the land" in stripping operations for the Sahara Coal Co., Harrisburg, Ill.

Equipped with a 30-cu. yd. dipper, it picks up a high, heaped load that may weigh up to 45 tons. And it goes through its cycle every 50 seconds. An outstanding feature of this gigantic shovel . . . *it levels itself, automatically.*

Ever since it began operation (in 1936), the gears and wire rope of this giant Bucyrus-Erie Shovel have been lubricated with Texaco Crater Compound. Texaco Crater Compound clings to gears and wire rope, for every type of service, lubricating, protecting, preserving, against wear and weather.

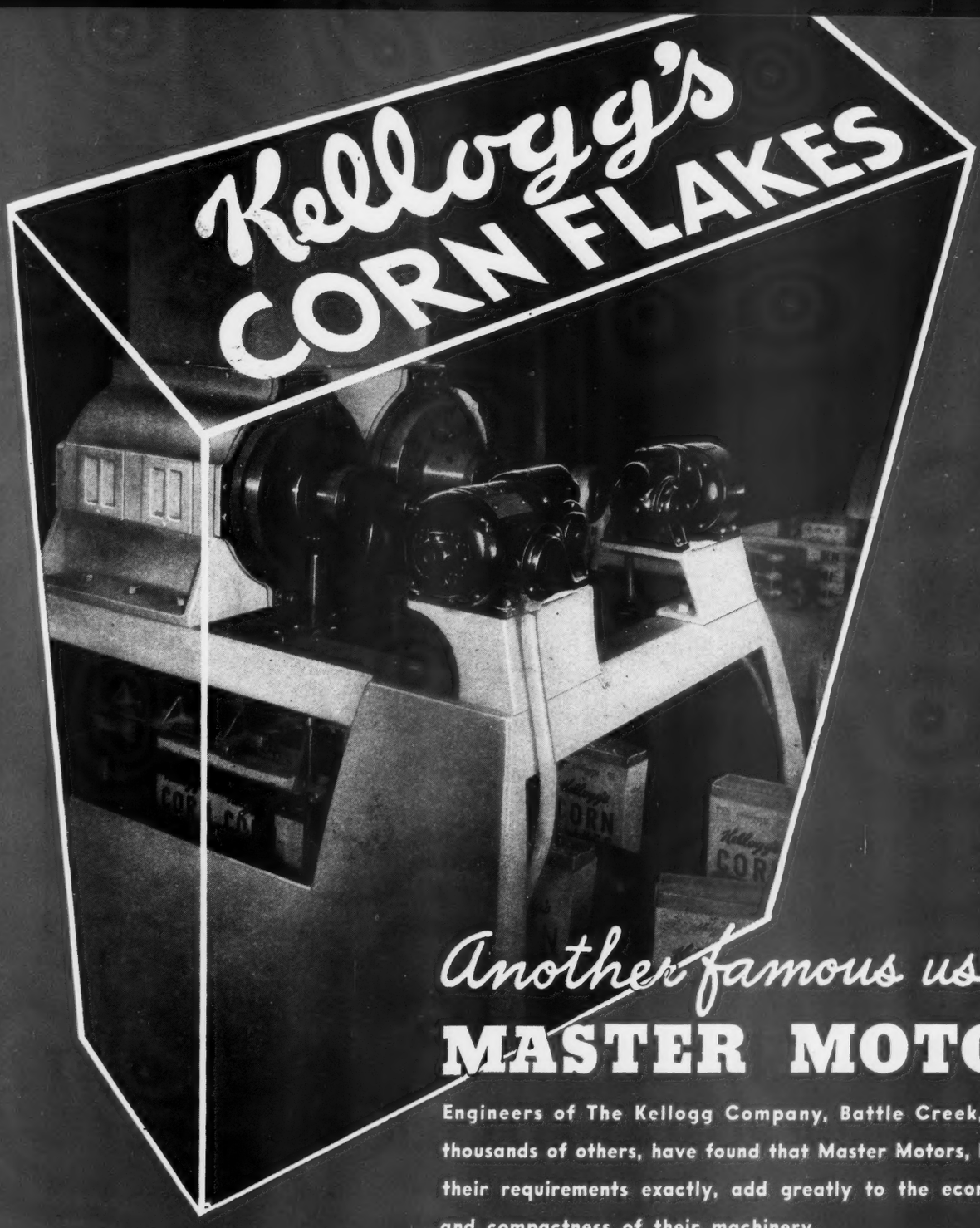
Trained engineers will help you select Texaco Lubricants for better results. To order, phone nearest of our 2229 Texaco warehouses, or write: The Texas Company, 135 East 42nd Street, New York City.

(Above) **THIS BUCYRUS-ERIE** has a digging radius of about 130 ft., a dumping radius of about 120 ft. Can dig against a face 92 ft. above surface on which it stands. Texaco Crater Compound keeps these big boys at their "level" best.

FREE BOOKLET. *32 pages of money-saving information on the lubrication of gears and wire rope.*

TEXACO CRATER COMPOUND

PERFECTED LUBRICATION FOR GEARS AND WIRE ROPE



Another famous user of

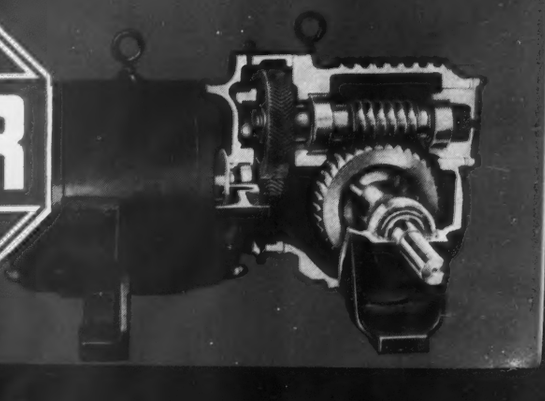
MASTER MOTORS

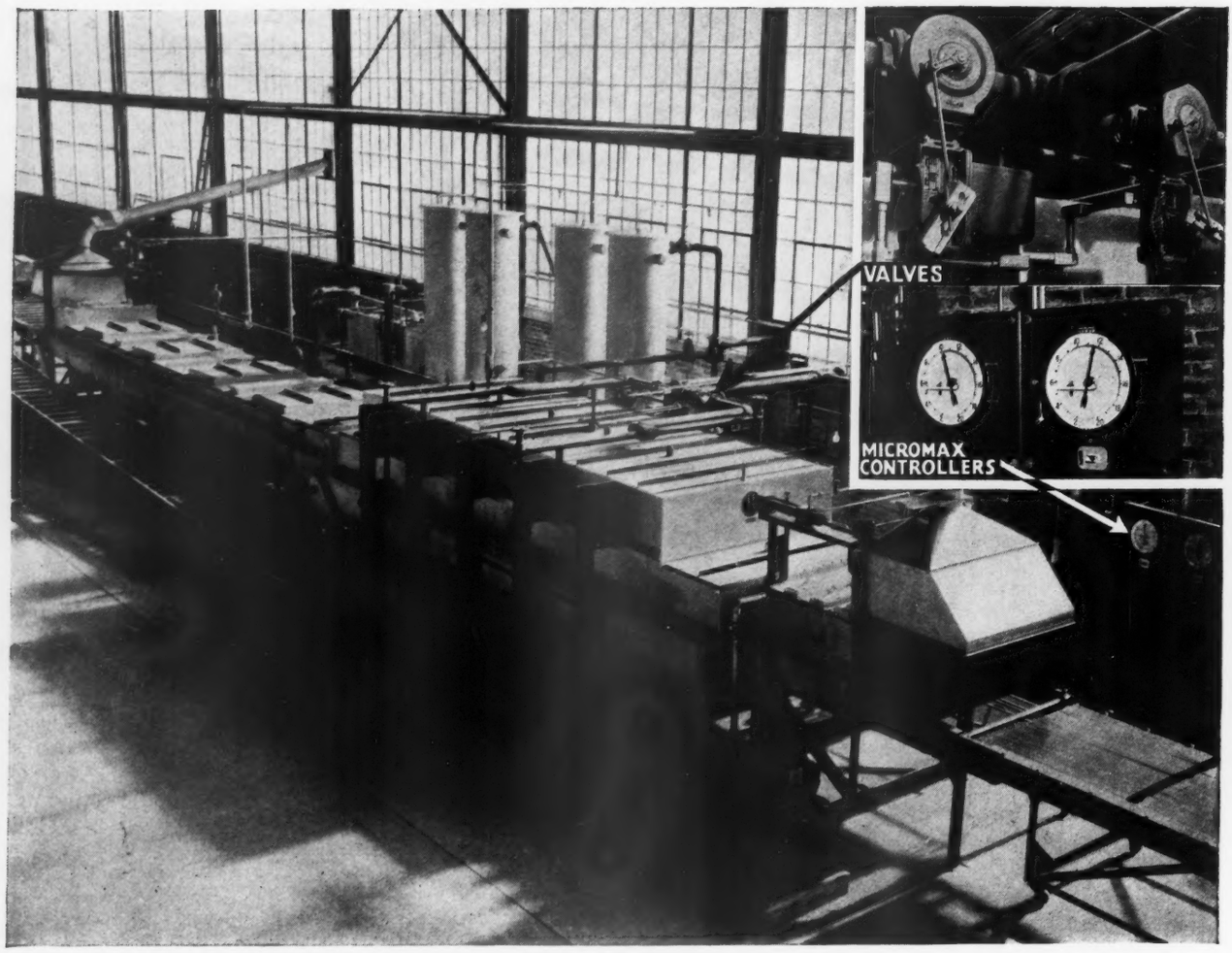
Engineers of The Kellogg Company, Battle Creek, Mich., like thousands of others, have found that Master Motors, built to meet their requirements exactly, add greatly to the economy, safety and compactness of their machinery.

When you need motors for your plant equipment or your product, investigate MASTER'S unusual ability to serve YOU promptly and economically with motors that really meet your individual requirements.

THE MASTER ELECTRIC COMPANY • DAYTON • OHIO

MASTER





Tubing of brass, copper and aluminum, made by Penn Brass & Copper Co., Erie, Pa., is annealed in this Electric Furnace Co. controlled-atmosphere bright-annealing furnace, with temperature regulated by two Micromax Electric Control equipments.

Uniform GRAIN SIZE IS EASIER TO GET WITH MICROMAX ELECTRIC CONTROL

Because correct grain-size is vital to good tubing, and because annealing temperature is a main factor in regulating grain size, the Penn Brass & Copper Co. "played safe"—insisted that the temperature regulation on their furnace must have the "micro-action" of Micromax Electric Control. Thus they are assured of the same dependable service received from their older L&N instruments, plus the micro-detecting and balancing action which acts on even the tiniest changes—heads them off regardless of size—to produce temperature so constant that manufacture of uniform tubing is greatly facilitated.

Because of its automatic adjustments for lag and load, Micromax Electric Control may be applied to the needs of any heat-using process.

See Catalog N-OOA "Micromax Electric Control"

LEEDS & NORTHRUP COMPANY, 4909 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Ad N-33A-626(1)

they GRIP *and* HOLD

THAT LOAD WITH fingers of steel

Watch Macwhyte Atlas Braided Slings in action. Note how, as the load's lifted, the strands and members tend to spread out and literally take a strangle hold on corners and smooth surfaces.

As one Macwhyte user put it, "They grip the load with fingers of steel!"

ONLY MACWHYTE HAS THIS ATLAS BRAIDED CONSTRUCTION

Macwhyte Atlas Safety Slings, because of their special braided construction, give as much as 400% *more* contact with the load than ordinary slings! They really "hug" the load safely in a steel grip. Then they're . . .

EASY TO HANDLE. This Atlas construction makes Macwhyte Slings extremely flexible, easy and quick to put around the load. They're

SAFE BEYOND COMPARISON . . . because they're made *from* the best steels, *of* right and left lay ropes *spliced endless, and braided by* skilled specialists. And they're . . .

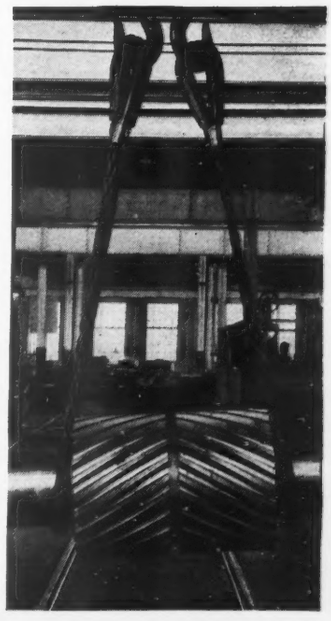
ECONOMICAL! Because they are time saving, labor saving, material saving, and life saving slings.

Follow the lead of nationally famous manufacturers: use the safety sling, Macwhyte Atlas Braided Wire Rope Slings.

IMPORTANT TO YOU

1. Expert consulting service. Write us about *your* handling problems. Our engineers will study them, help you solve them, show you how to get better service at lower cost. This consulting service is furnished without obligation.

2. "How to Handle Loads Safely" . . . an on-the-job booklet showing how Macwhyte Slings solve materials handling problems of every kind, every day. Send for this booklet.



NO. 393

MACWHYTE COMPANY

Manufacturers of Wire Rope and Braided Wire Rope Slings. Main Office and Factory: Kenosha, Wisconsin
New York . . Pittsburgh . . Chicago . . Ft. Worth . . Portland
Seattle . . San Francisco. (Distributors throughout U. S. A.)

Member National Safety Council

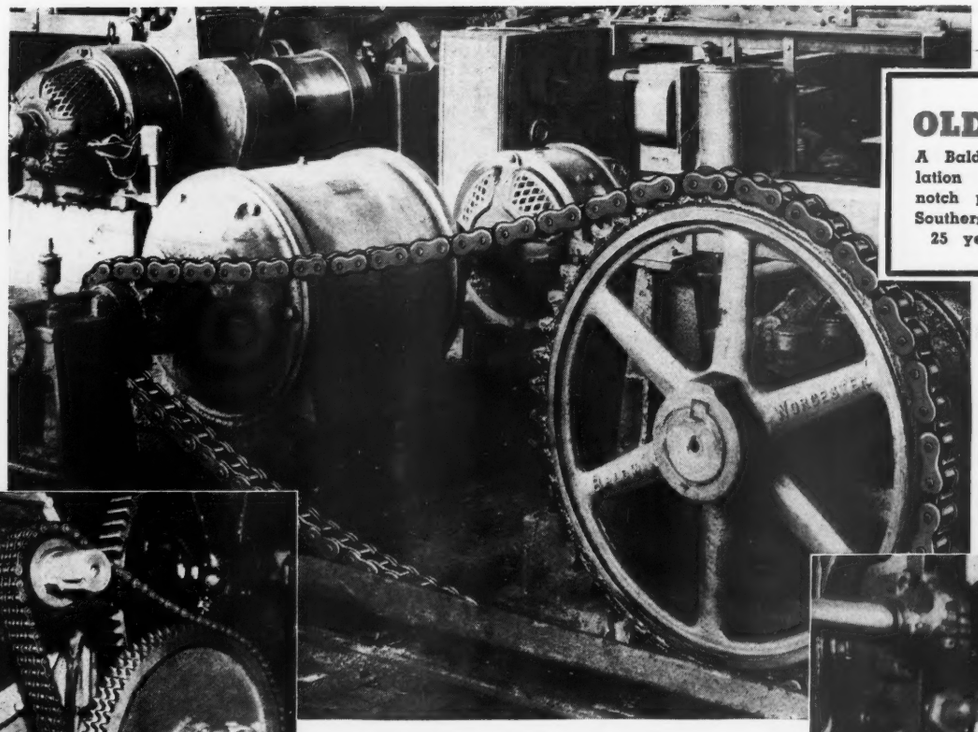
MACWHYTE

Braided WIRE ROPE *Slings*

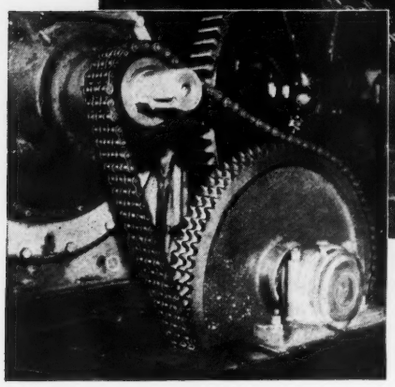
Electric Motor Bearings completely machined and finished—ready for assembly—for all makes of electric motors from 1/50 to 100 hp, are only a part of Bunting's time and money-saving ready-made bearing service. Hundreds of different sizes of standardized finished bearings for all mechanical applications, Bunting Precision Bronze Bars—machined I.D., O.D. and ends—are other products instantly available from stock. Write for catalog . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.

BUNTING Quality

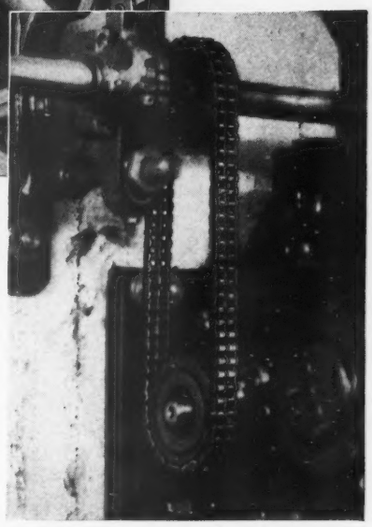
BRONZE BUSHINGS • BEARINGS
PRECISION BRONZE BARS
BABBITT METALS



OLD TIMER
A Baldwin chain installation still giving top notch performance in a Southern steel mill after 25 years.



STAR PERFORMER — Drive from a diesel engine in Ohio plant—Baldwin roller chain.

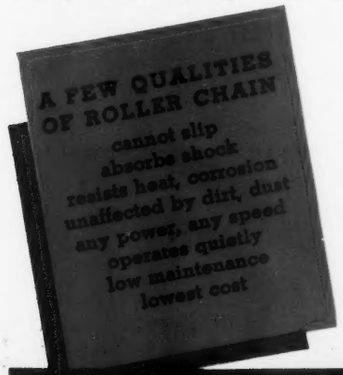


SWELL DRIVER—Baldwin does a steady, reliable job on this Hoffman Stoker Drive.

No "Old Age" Problem Here

Baldwin roller chain is more than a long lived power transmission drive. It maintains an efficiency of 98.6% throughout its long life. On top of this is its low maintenance cost. When the installation is properly made, even 25 years' service with nothing but occasional lubrication is not unusual.

These are the three big points that make Baldwin roller chain the favored choice with engineers who have most carefully analyzed their drives. Such men realize that recent advances in chain design have brought the admitted advantages of roller chain to hundreds of applications where it was not used even three years ago.



Here's a positive, powerful, efficient, low cost, long lived medium of power transmission. Let the B-D Man show you the way it is being used today on drive problems of all sorts.

Baldwin-Duckworth Chain Corporation
Springfield, Mass.
Factories at Springfield and Worcester, Mass.

BALDWIN-DUCKWORTH

"Look before or you'll find yourself behind"
POOR RICHARD - 1735

When Ben Franklin wrote this back in 1735 he might have been giving advice to 1939 manufacturers. It still pays to look ahead—and when you really "look ahead" in power transmission and conveying you specify Baldwin Roller Chain

"G-MEN" of Profit on a "Million-mile Front"!

From the first platform scale developed by Thaddeus Fairbanks for weighing hemp-laden carts, more than a century ago, Fairbanks scales have gone a long way. Today they are *Guardsmen of Profit* on a million-mile front—in every type of business—in every industry. Scales that count small parts with uncanny accuracy. Scales that make printed records of weight—automatically. Scales that weigh cars in motion. Beam scales... dial scales... mammoth scales that weigh gigantic bulk.

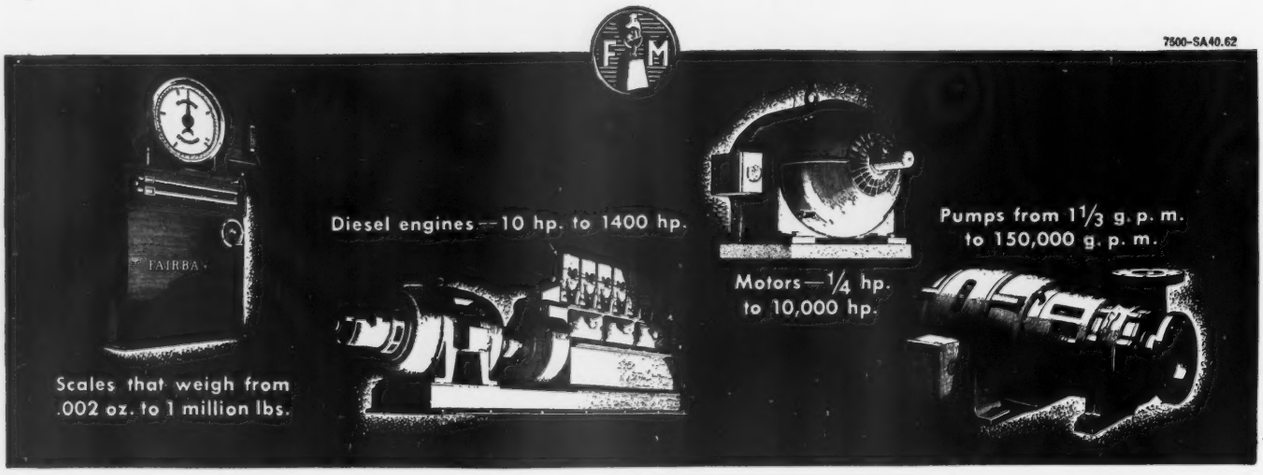
But it is not for scales alone that industry looks to Fairbanks-Morse. The same sound principles that have made Fairbanks scales a familiar name in practically every civilized country have also won for this organization a commanding position in other fields: Pumps, diesel engines, motors, electrical machinery, farm equipment, stokers, air conditioners.

For complete information about any of these products, write Fairbanks, Morse & Co., Dept. 30, 600 S. Michigan Avenue, Chicago, Illinois. Branches and service stations throughout the United States and Canada.

FAIRBANKS-MORSE *POWER, PUMPING, AND WEIGHING EQUIPMENT*

109 YEARS OF PRECISION MANUFACTURING

7500-SA40.62


Scales that weigh from .002 oz. to 1 million lbs.
Diesel engines—10 hp. to 1400 hp.
Motors—1/4 hp. to 10,000 hp.
Pumps from 1 1/3 g. p. m. to 150,000 g. p. m.

WHERE STEEL MEETS weather
HOT-DIP GALVANIZING *IS NEEDED*

In the outdoors, nothing serves so efficiently—for so long—for so little—as Hot Galvanized Steel . . . Structural work, grating, bolts and nuts, every item in which rust is a serious menace needs the natural and economical protection of Hot Dip Galvanizing . . . Members of this Association employ expert personnel and operate the most up-to-date shops in the industry; they guarantee you a quality hot dip job every time and approximately two and one-half ounces of zinc on every square foot of surface . . . American Hot Dip Galvanizers Association, Inc., American Bank Building, Pittsburgh, Pa.

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE

OFFICIAL • INSIGNIA
GALVANIZED PRODUCTS
PROTECTED BY GENUINE
HOT-DIP GALVANIZING
AMERICAN HOT DIP GALVANIZERS ASSOCIATION INC.
1936

Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Stamping Co., Rochester, N. Y.
Buffalo Galvanizing & Tinning Wks.,Inc.,Buffalo, N.Y.
Columbian Steel Tank Company, Kansas City, Mo.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
The Fanner Mfg. Company, Cleveland, Ohio
John Finn Metal Works, San Francisco, Cal.
Thomas Gregory Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa.
The Hodell Chain Company, Cleveland, Ohio
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Columbus, Ohio
Joslyn Co. of California, Los Angeles, Cal.
Joslyn Mfg. & Supply Co., Chicago, Ill.
L. O. Koven & Brother, Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Missouri Rolling Mill Corp., St. Louis, Mo.
The National Telephone Supply Co., Cleveland, Ohio
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Cal.
The Sanitary Tinning Co., Cleveland, Ohio
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
The Witt Cornice Co., Cincinnati, Ohio

Read how Gaylord boxes win loyal friends for your products . . . at no extra cost

In today's keen competition, almost every order you obtain has run the risk of being lost to a competitor who wanted it just as much as you did. And in holding customers, the condition and appearance of your product on arrival is of vital importance.

By giving products more reliable protection en route . . . through their built-in Gaylord "Extra Margin of Safety" . . . Gaylord Boxes are helping maintain and increase customer satisfaction for hundreds of the country's best manufacturers.

Yet the cost of increased customer satisfaction, secured the Gaylord way, is usually more than paid for by reductions in damage claims, simplified packing or increased sales. In fact, because Gaylord Boxes, both corrugated and solid fibre, are designed to fit the particular needs of your product and your packing and merchandising operations, they often bring welcome economies.

May we place our complete staff at your service? No obligation. Just phone or write today.

Gaylord Boxes

CORRUGATED AND SOLID FIBRE

Also Gaylord Folding Cartons... Grocery Bags and Sacks... Kraft and Specialties

GAYLORD CONTAINER CORPORATION, General Offices: SAINT LOUIS

There's a Gaylord plant or sales office in your territory

True Story OF A KILLER

THIS IS the "before and after" history of a vicious moulder drive in the Millen Lumber Company plant, Millen, Georgia. A direct line-shaft hook-up, operated intermittently by the tension of a heavy idler dropped against the belt—it was a belt-killer if there ever was one.

Under the frequent application of this extremely heavy starting load, belt after belt tore out at the fasteners or popped off the pulleys. When belts were not being relaced, they were being respliced to take out stretch. And even with these constant repairs a few months' service was tops.

Reformed — by the G.T.M.

Then the Millen people called in the G.T.M. —Goodyear Technical Man. He came, consulted, analyzed and on his recommendation the line-shaft was torn down to permit the application of a Goodyear COMPASS "40" truly endless belt. This was done on February 3, 1936.

That's where this story ends. There has been no trouble since — no breaks, no resplicing, no repairs or replacements, no shut-downs to put the belt back on the pulleys. The Goodyear COMPASS has "taken it" day after day for nearly three years — outlasting many of the previous type belts at a fraction of the cost!

You'll get this same economical service from all Goodyear products — belts, molded goods, hose, packing. To bring the G. T. M. to your plant just write Goodyear, Akron, Ohio, or Los Angeles, California —or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

• • •

YOU CAN DO IT BETTER WITH GOODYEAR RUBBER

THE GREATEST NAME IN RUBBER

GOODYEAR

HOW Century

Can help you get the finest . . .

MOTORIZED JOBS WITH COST-SAVING PERFORMANCE

The ability of Century to prescribe a standard type of Century Motor for most of the many motor needs of industry is a result of 35 years of motor design and applied engineering directed to industry's benefit.

If you will look at the column to the right you will see a few examples of how Century engineers have improved the performance of motors through design refinements.

A modernly-equipped plant in St. Louis, devoted exclusively to the manufacture of electric motors and generators — here specialists are daily at work in experimental, testing, and laboratory departments to assure the kind of service you want your dollars to buy.

Century's extensive line of standard type motors in types and ratings up to 600 H. P. begins with fractional H. P. motors from 1/100 H. P. and covers wide industrial applications.

Special motors are available for special requirements and surroundings.

WHAT YOU GET *with* CENTURY MOTORS

- ★ **A new higher standard of Air Conditioning performance, including quiet starting and operating—no need of over-motoring.**
- ★ **Machine Tool output held to closer tolerances, because of remarkable freedom from vibration.**
- ★ **In wet processing industries, when washing down the plant, even a careless operator can't get liquids into the Century Splash Proof Motor — ideal for outdoor installation.**
- ★ **In metal working plants, you reduce maintenance cost and production stoppages, with a Century splash proof motor to protect against splashing oils, falling chips.**
- ★ **Motors suited for hard to start jobs — refrigeration compressors, oil well pumps, etc.**
- ★ **Motors for automatic starting with low starting current, yet high starting torque, results in low cost, simplified control, less shock to the power line.**
- ★ **Motors that reduce load shocks and increase life of equipment.**
- ★ **Motors that start with smooth and gradual acceleration.**
- ★ **Motors up to 600 H. P. for industry — motors down to 1/100 H. P. for the domestic markets. The most complete line of types, by one of the largest exclusive motor specialists in the world.**

CENTURY SERVICE EASILY AVAILABLE

31 CONVENIENTLY LOCATED BRANCH OFFICES AND 125 SERVICE SET-UPS

A Century motor representative, who is a specialist in his line, can be reached at any one of 31 conveniently located branch offices. The accumulated experience of Century engineers is always at the disposal of any one faced with a motorization problem — whether it be in connection with new design or redesign of any motorized product.

Century MOTORS

CENTURY ELECTRIC COMPANY

1806 Pine Street • • • St. Louis, Mo.

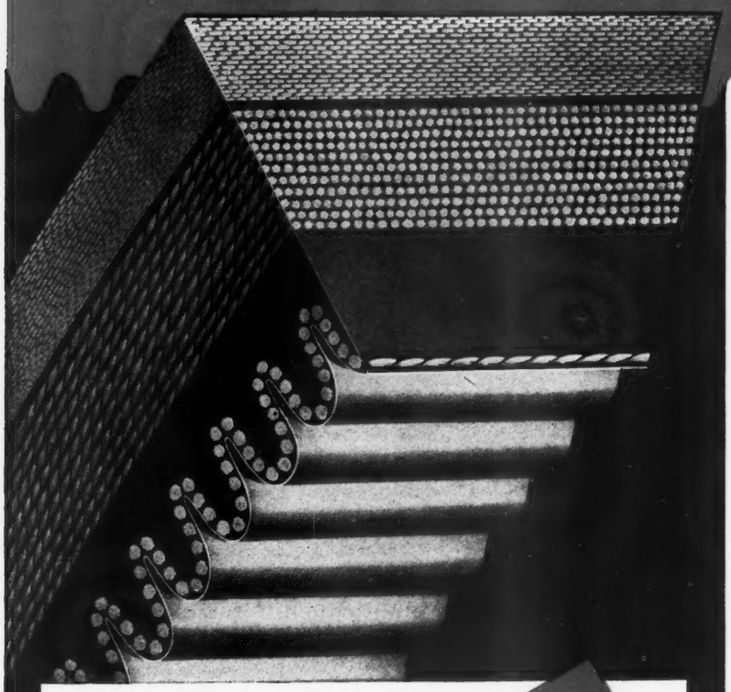
Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Charlotte • Cincinnati • Cleveland • Dallas Denver • Davenport • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City • Los Angeles • Milwaukee • Minneapolis • New Orleans • New York • Omaha • Philadelphia Pittsburgh • Rochester • Salt Lake City • San Francisco • Spokane • Seattle • Tulsa

ONE OF THE LARGEST EXCLUSIVE MOTOR MANUFACTURERS IN THE WORLD

For Longer Life and Fewer Adjustments

DEMAND *Super-Flex* DAYTON COG-BELTS WITH DAYTEX CORD



Developed as a result of 7 tireless years of tests and research by Dayton's famed technical laboratories, Super-Flex Dayton Cog-Belts with Daytex Cord in their neutral axis section reduce maintenance expense to a minimum never before achieved.

Daytex Cord, steel-like in strength, is made from highest grade long-staple, hard-bodied cotton. In the process of manufacturing, a bonding-compacting agent removes the non-essential oils and waxes from the individual fibres. This causes the fibres to interlock and form a stronger, yet more compact cord.

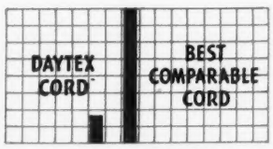
Due to Daytex Processing—Daytex Cord becomes on an average 22% smaller in diameter. It improves in tensile strength, runs cooler, stands up under constant high-speed flexing. Furthermore, it has lower stretch and, due to interlocked fibres, has minimum tendency to become lifeless.

This denser Daytex cord is cooler running because highly developed rubber compounds are forced into and around each individual cord by Dayton's patented Latexing and Calender Process. These processes have been pioneered, and constantly improved by Dayton for 19 years.

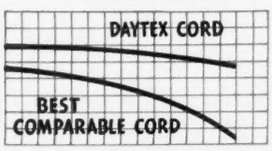
Outstanding in basic design, Super-Flex Dayton V-Belts are built to bend with patented cog construction. They work on short centers—save space—assure you longer life—and reduce adjustments to a negligible minimum. So to step-up *your* production standards—to lower your costs, demand Super-Flex Dayton V-Belts made with Daytex Cord.

THE DAYTON RUBBER MFG. CO., DAYTON, O.

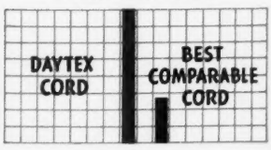
The charts below show results of laboratory tests of Daytex Processed cord versus best comparable cord NOT Daytex Processed.



LESS STRETCH
Stretch test-cords.



STRONGER
Tensile test-cords.



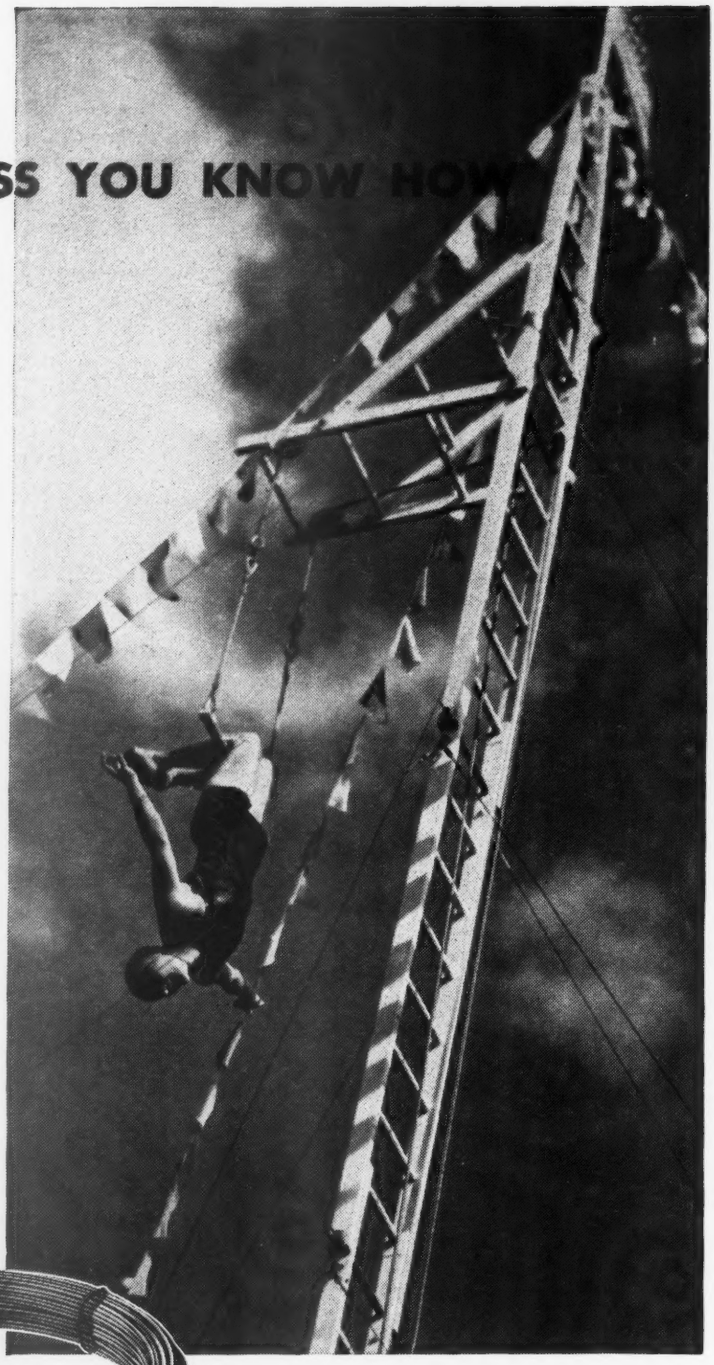
LONGER LIFE
Belt flexing test.

LABORATORY TESTS PROVE THE OUTSTANDING SUPERIORITY OF DAYTEX CORD

Super-Flex
Dayton
COG-BELT DRIVES
WITH DAYTEX CORD

MADE BY THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

DON'T TRY THIS UNLESS YOU KNOW HOW



It takes "knowing how" to do this feat . . . and it takes "knowing how" to put Quality into Wire.

LEARNING to do anything well takes years of experience. This is particularly true in drawing uniform wire of high quality for manufacturing purposes. There are thousands of different uses for wire and each presents its own particular problem.

We have a background of over 100 years of wire-making experience. For over a century we have been assisting manufacturers in solving their problems involving wire; and then producing the kind of wire that helps make trouble-free production possible.

Whether you make one or many products from wire, you will find that you can get the best results from American Quality Wire. Our mills are strategically located so that deliveries can be made promptly and economically to meet your schedule of production; thereby assuring you of complete service as well as wire of top quality.

Premier Spring Wire · Weaving Wire · Pin Wire · Bolt, Rivet and Screw Wire · Broom and Brush Wire · Pinion Wire · Basic and Bessemer Screw Stock · Premier Tested Welding Wire · Flat Nut Stock · Hair Pin Wire · Mattress Wire · Music Spring Wire · Piano Wire · Amercut Cold Finished Steel Bars · Pump Rod Bars · Wool Wire · Wire Rods · Also U·S·S Stainless and Heat-Resisting Wires.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Laboratory where delicate oils and aromatic substances are compounded and packed.

Storage of essential oils from world-wide sources.

VITAL INVENTORY DATA

At A Moment's Notice

Accurate control of materials on hand, on order and sold on contract is vitally important to Fritzsche Brothers, Inc., New York. Mr. F. H. Leonhardt, President, recently commented as follows on the dependability of McCaskey methods in the control of more than four thousand items:

"Our line includes essential oils, flavors, drugs, aromatic chemicals and perfume raw materials—hundreds of basic materials from the farthest corners of the earth. To know precisely where we stand with respect to stocks on hand, materials ordered but not received, and goods sold on contract, is absolutely essential to the efficient and successful operation of our business.

"The McCaskey Inventory Control System first installed for us in 1923 gives us these vital details at a moment's notice. With this information readily at hand, we can make our purchases most advantageously in the hundreds of widely scattered and highly volatile markets which represent our principal sources of supply. It also enables us to keep adequately supplied with those items which sometimes requires from three to six months from the date of order until delivery.

"In handling so many valuable and diversified materials, close scrutiny of inventory is essential. Our complete satisfaction with the operation of the McCaskey Control is evidence by the fact that we are still 'sold' after more than fifteen years."

Let us send you our pamphlet "Perpetual Inventory Simplified", presenting the fundamentals of this and scores of other installations of McCaskey Inventory Control. Or better still, let us have a field representative suggest an application to your specific needs. No obligation.

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

PRINCIPLES OF THE BALL BEARING

Load on a plain bearing is supported by a film of oil, the functioning of which is dependent upon such variable factors as film thickness permitted by bearing radial clearance and the effect of temperature changes upon lubricant viscosity. Maintenance of the oil film is influenced by other variables, such as speed of rotation, the method of lubricant supply, the design of oil-distributing grooves, and the changes in bearing clearance due to heat, as well as wear induced by sliding friction.

To secure m…urate positioning of shafts and reduce the powe… but in a manner not subject to f… progressively changing… ollers, first of cylind… early employed.

Even in … earings possessed ver… personal transportatic… portance hitherto not… became a matter of ir… proved a necessity.

Just … ke became synonymo… experience with the … the present day form… double row type) be… d lubricated-for-life …

Wh… l bearing are Americ… k, financed by the Deut… e by research the fundamenta… e modern ball bearing. These principles were… by Conrad in designing the single row annular or radial … nd by New Departure engineers in their development of the double purpose, combined radial and thrust ball bearing.

— *in short*

The performance of New Departure Ball Bearings is *accurately predictable*

The ball bearing has, therefore, been distinguished from other forms of rolling bearings, in having a sound background of scientific principle governing its design. The resultant load-carrying capacity has thus not been merely a matter of experiment, but is subject to as accurate a mathematical determination as is the strength of a steel bridge. Though, compared with the plain bearing, the ball bearing is a mere infant in age, its load-carrying ability, endurance life and friction loss is predictable with infinitely greater accuracy and assurance than that of any other form of shaft support.

The steel ball, due to its shape, possesses inherent advantages not equalled in any other form of rolling body, in that whatever the angle

FACTORY
MANAGEMENT and MAINTENANCE

L. C. MORROW, Editor

Let's Keep the Sit-Down an Outlaw

IN THE INTEREST of Wagner Act revision, management was asked last month, on this page, to make its opinions known to Congressmen. At that time the indications were that Congress soon would be considering revisions.

However, conditions have changed. The Supreme Court has outlawed the sit-down strike, and the two factions of organized labor have begun peace negotiations.

Both actions have served to affect Congressional attitudes toward Wagner Act revision. The court decision has strengthened the force of the argument advanced by some members of Congress that the Act will become workable by reason of Court interpretations. The union peace movement forecasts the possibility of a single union attitude toward the Act with consequent removal of the danger that members of Congress will be squeezed between two warring factions.

These changed conditions do not make any less imperative the obligation of management to voice its opinions to Congress.

Though a majority opinion outlawed the sit-down strike, there was a minority opinion by Justices Reed and Black that would have had the Court condone it. Justice Frankfurter did not participate in the decision. The personnel of the Supreme Court changes. Minorities can become majorities. Assurance that the sit-down strike will remain a prohibited weapon can come about only when Congress writes that interpretation into the law.

Up to this time, CIO apparently has been satisfied with the Wagner Act. AFL has asked for revision because it has believed the Board favored CIO. Let the two labor factions get together, and AFL probably will go over to the CIO viewpoint, or united labor will ask for a law even more stringent so far as employers are concerned.

There is no reason why Congress should act differently even if labor does have internal peace. If the law needs changes, it needs them no matter whether labor is one big, happy family or not.

There is no reason why Congress should rely upon Supreme Court interpretations. The law is of Congress's making. Therefore let Congress say just what the law means.

To get Congress into the frame of mind where it will do a positive job, a great deal of prompting will be necessary. Again we urge management—associations and individuals—to tell their Congressmen what revisions they want in the Wagner Act.

L. C. Morrow

2,000 Products to Package

Some in tiny ampoules, some in big casks. Problem is to keep things under control. This company uses a stock-limit system for 1,800 slower-moving products, has a far more accurate plan to control the 200 items that make up 75 per cent of its volume

W. M. KIMBALL, *Planning Department Manager, Merck & Company, Inc., Rahway, N. J.*

Packages of Merck chemicals range in size from sealed ampoules containing 1 milligram to casks weighing 800 pounds

MORE THAN 15,000,000 PACKAGES of Merck chemicals are distributed each year, ranging in size from sealed ampoules containing 1 milligram to casks of 800 pounds. Customers are equally diverse, including industries, laboratories, colleges, hospitals, druggists, physicians, workers in the arts and crafts, and the general public. Stocked in the regular line are more than 2,000 items and between 4,000 and 5,000 subdivisions.

In order to provide the necessary chemicals, containers, labels, and supplies in the right quantities and at the right time, a planning department was organized in 1930 and charged with the following responsibilities, which may be considered the three basic elements of production planning:

1. Maintenance of adequate stocks for sales.

2. Control of inventories to assure satisfactory turnover.

3. Efficient use of men and materials in all production operations.

The system about to be described covers packaging production only, and does not take into consideration scheduling of manufacturing operations.

Sales Estimate First

First step in this program is an accurate sales estimate. The sales department furnishes as much information as possible regarding contracts with important customers, proposed advertising and sales campaigns, development of new uses, and current business conditions. The total figure submitted for one year for each item or group of items is then analyzed by the planning department. Past sales and graphs showing trends enable us to break down these long-term estimates into quarterly and monthly figures to determine seasonal variations, and to work out production programs for the different sizes or subdivisions.

Figure 1 illustrates the trend of a staple product over an 8-year period. The figures are yearly sales cumulated quarterly, the latest quarter being added and the corresponding quarter of the previous year being dropped. From the general direction of the curve we determine whether demands are increasing or declining and adjust our production plans accordingly.

In the chemical industry it is extremely important to follow trends as new developments and products, especially in the industrial and medical fields, make one chemical obsolete while another skyrockets overnight.

The planning nerve center is an accurate stock-record system (Figure 2). Six manually posted, visible-file cabinets hold reliable stock figures on about 2,000 items and 5,000 subdivisions. In the figure, the top card is for "subdivisions" the other for bulk items. Postings to subdivision cards have been reduced by accumulating sales slips for three days and running a tabulation by machine.

From a review of sales we establish markers or "danger limits" at which each of these units is brought up automatically. Good stock records are invaluable in eliminating back-orders and bringing overstocks to light. They are referred to constantly, not only by planning, but by the sales and order departments for determining our stock position before quoting or accepting customers' orders.

The year 1923 found Mr. Kimball tucking a Bowdoin College diploma under his arm and going to work on stock control for a wholesale drug house. Joining Merck & Co. in 1926, he was placed in charge of time study, later made assistant to the production manager. In 1930 he organized the package planning and stock records departments which he tells about in this article.

For convenience we have divided the active products into two groups, the first consisting of about 1,800 slower selling items which have comparatively little effect on our production, the second of about 200 items which account for over 75 per cent of our productive activity.

The first group is under a marker or stock-limit control plan by which stocks are automatically replenished when the marker limits shown on the stock-record cards are reached. For subdivisions the marker limits established by the planning department are based on average sales and allow the production division two to three weeks to put up new supplies. When sales bring the stocks to the marker, a job card (Figure 3) is issued by the stock records department. The ordering quantity, also set by planning, is enough for from one to three months' sales, depending on the nature of the item.

As for bulk stocks, a notice is sent to planning when the marker is reached. A control sheet (Figure 4) showing the length of time required to prepare new material, economic ordering quantities, keeping qualities, cost, and sales is consulted before deciding how much to order and the delivery date desired.

Application of a simple stock-limit control plan to this group is possible only because quantities are relatively small, require standard parts always in stock, and runs are confined to hand work involving slight set-up cost. Any other type of control for 1,800 small items would raise clerical costs above any possible advantages.

Although bulk stores and slow-moving products can be handled satisfactorily by the stock-limit or marker control plan, the faster selling items must be more closely and accurately controlled.

Checked Regularly

These are of sufficient importance to necessitate regular review at stated intervals, usually every month, at which time detailed estimates and production schedules for each size are issued. The stock-limit control plan is impracticable for this group because of its tendency to release job cards at irregular and spasmodic intervals, and because there exists the possibility of releasing simultaneously job cards for several items handled on one machine.

The control sheet (Figure 5) for the scheduled items lists:

1. Actual sales.

2. Estimated monthly sales for each item and size.

3. Minimum stock limits. As a safety measure stock records notifies planning if these minimums are touched.

4. "B" values, or time required to complete each subdivision under the Bedaux system, as determined by the standards department.

5. Keeping quality. Time limits are furnished by our control chemists, which must be adhered to regardless of possible economies in producing above the established limits. Consideration must be given to spoilage and loss of appearance, which are natural attributes of many chemicals.

6. Principal customers and contracts.

7. Standard delivery containers used by the factory.

8. Economical production quantity. This figure is determined for each size by a simple algebraic formula which takes into consideration cost, sales (rate of turnover), and machine job-change expense. More elaborate formulas to include interest, depreciation, and cost of storage have been devised but are usually too complicated to be practical.

9. Time required to produce bulk.

10. Time required to obtain containers and supplies.

11. Time required by control laboratory to test and approve.

12. Stock on hand (taken from stock records) at the time the schedule is brought up. If this figure is above or below the desired inventory, future schedules are revised accordingly.

13. The percentage of each put-up to be sent to our branches. This figure is based on an analysis of the branches' yearly sales. A quota of each run is sent directly from the machines to the waiting freight cars.

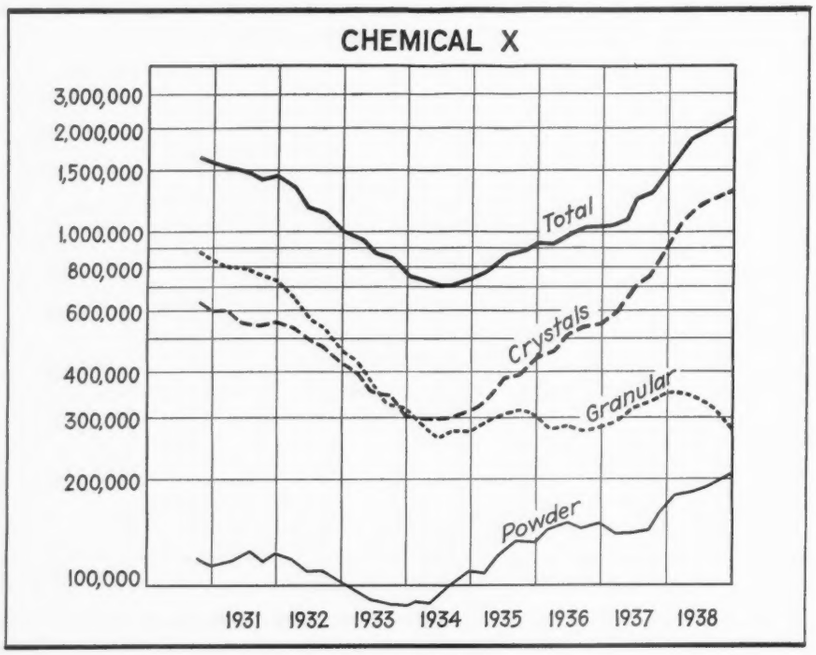


Figure 1. From the general trend as shown in graphs like this, it is possible to determine whether demands for specific items are increasing or declining

From the information given by these control sheets a production schedule (Figure 6) is prepared, which shows immediate production and furnishes estimates for the period in which additional stocks can be produced, usually from one to three months.

The production division aranges to obtain the bulk, and the supplies department the containers, by the date specified under the "Estimates" column. In the event of a delay, it is their reponsibility to notify the planning department so that necessary adjustments can be made.

Job cards are then issued for the subdivisions shown on the schedule. They are routed through stock records to be deducted from bulk and added to subdivision stocks. The smaller hand jobs are sent directly to the packaging department, but the machine jobs are retained at the dispatcher's desk in the planning department, where the backlog of machine work is figured and actual dispatching to the various machines is done.

Every Thursday the dispatch clerk prepares a machine-run program for the following week. The sequence of jobs is determined by the stock on hand, similarity of containers, and cost of changing from one job to a new set-up. Copies of these machine schedules are sent to all departments having any contact with production, so that bulk, containers, labels, and operators may be available at the machines at the right time. The shipping depart-

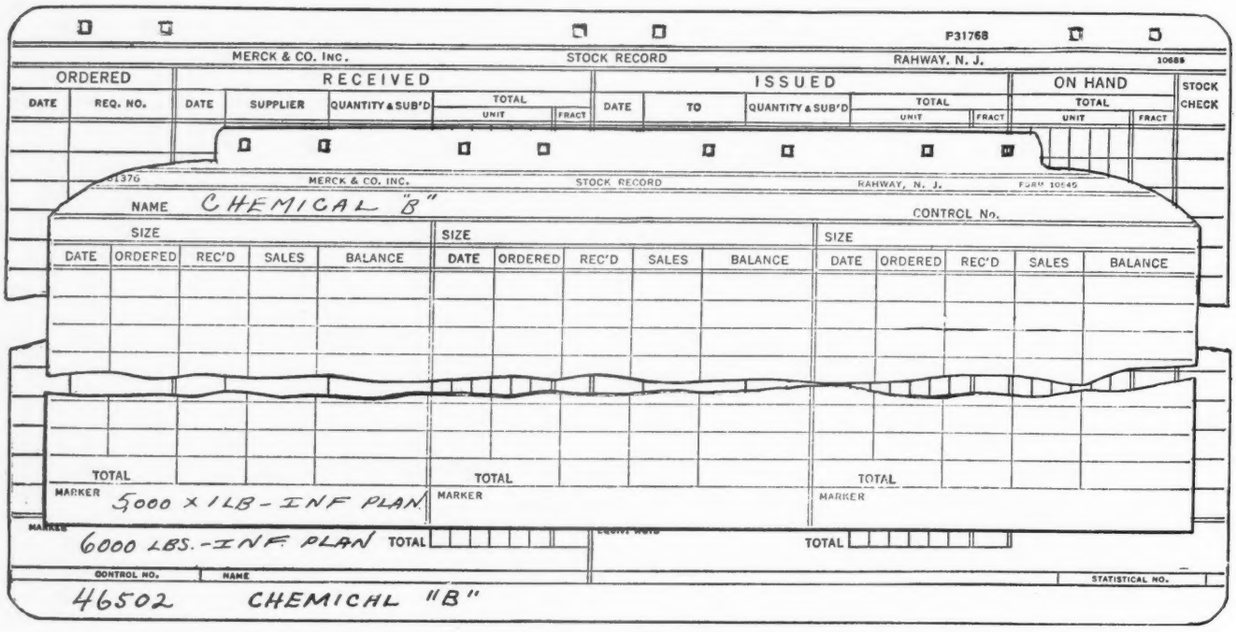


Fig. 2. Planning nerve center is an accurate stock-record system. Bottom card is for a bulk item, upper for a subdivision

CONTROL No. 2967

MERCK & CO. INC.

E 7288

Chemical "C"

QUANTITY

PUT UP By March 25

SUBDIVISION: 60 x 1 lb

CONTAINER: SCB

LABELED BY	PACKED BY	EXAMINED & COUNTED BY	SENT TO SHELF BY

DATE STARTED	SPECIAL SEALING	CONTAINERS AVAILABLE
DATE FINISHED		RETURN TO PLANNING DEPT.

LABELS OVER	LABELS SHORT	ENTERED BY STOCK RECORDS
TORN	ADDITIONAL	

PACKING WANTED

_____ PACKED 4
_____ " 6
_____ " 8
_____ " 10
_____ " 12
_____ " 16
_____ " 20
_____ " 24
_____ " 25
_____ " 50
_____ "
all LOOSE

CONTAINER SIZE: #80

ORDERED BY: M.K.

DATE: 3/11/39

MARKER: 40

60

STOCK: 42

TAKEN FROM LOTS

CONTROL No.

GOODS CORRECT

WEIGHED BY

DATE

MEMO. WRITTEN BY

TIME

LABEL DATE

CORRECT LABELS GIVEN

CORRECT LABELS REC'D

PACKING ORDERED BY

DEDUCTED
MAR 4 1939
I. M. K.

Figure 3. Slower selling items are controlled by a stock-limit plan by which stocks are automatically replenished when limits are reached. Here is the job card that the stock records department issues when additions to subdivisions are needed

MERCK & CO — PURCHASE AND PLANNING RECORD — RAHWAY, N. J. — 10687

ORDERED DATE	REQ. NO.	PK'GE	QUANTITY	FOR DELIV.	RECEIVED DATE	RECEIVED QUANTITY	BULK STOCK	SUBDIVISION STOCKS SIZE	5 lt.	1 lt.	½ lb.	1 oz.
								MARKER	10/12	40/60	60/100	100/150
1/23/38	4268	4×200 lbs	800	Feb 25	Feb 21 1938	800 lbs	200		12	70	65	125

MERCK & CO. — PURCHASE AND PLANNING RECORD — RAHWAY, N. J. — 10686-A

PRINCIPAL CUSTOMERS
J. A. Dalton
I. K. French
Eimer & Amend
E & M Products Corp.

SUPPLIERS

PRINCIPAL CONTRACTS
Jones 2000 lbs 6 mo - 12/26/37
Wright 8000 lbs 12 mo - 6/6/38

REMARKS
As mordant in dyeing. Tech.

DETERIO RATES: No

SEASONAL: Yes — SHIPMENT TIME REQUIRED: June-Sept — MINIMUM

KEEPS HOW LONG: Indef

APPROX. COST: .32

PUR. DEPT. WOULD LIKE

ORDERING QUANTITY: 800 lbs

SIZE & CONTAINER: 200 lt bbl

Lab. rejection 2/1/35 - Improper mesh

MARKER: 200 lbs — BULK: Soft Flax

CONTROL NO.: 19621 — NAME: CHEMICAL "M"

Figure 4. Control card and order sheet used for slower moving bulk stocks

MERCK & CO. INC. — PLANNING DEPT.

Article: Chemical "B" — Control No. 16502

Sizes	1/4 lb. Canst.	1 lb. Canst.	Total lbs.
Markers	18,000 Inf. Plant	5,000 Inf. Plant	

Rec. in: 250 lb. bbls + 100 lb. bags
14 Inf. Plant
Reserve 5,000 lbs.

Month	1936	1937	1938	1938 Est.	Date	Stock	J.C. Out	1936	1937	1938	1938 Est.	Date	Stock	J.C. Out	1936	1937	1938	1938 Est.		Bulk	Pending	Last Receipt
Jan.	34494	45350	38178	40,000	14	20,232	No	11177	14430	13517	15,000	14	14,118	No	24315	35953	34287	35000	B	14 / 5308 lbs.	1/13 / 41,750 lbs.	12/18 / 35,000 lbs.
Feb.	27719	36997	31323	35000	13	24,164	No	8616	13054	10810	12000	13	4,681	No	21926	30078	31886	35000	S	13 / 9507 lbs.	2/12 / 41,750 lbs.	1/22 / 41,750 lbs.
								12186	11545	11791	12000	11	5,402						11			2/20
Dec.	27367	27946						9107	9399						20374	31359		40000				
Total	107274	138278						127,274	144 90						323338	409,584		440,000				

B Value 47 B's PER M — 70 B's PER M

Produce 35,000 — Cost MAT. .035, PKG. .036, TOT. .071

10,000 — Cost MAT. .14, PKG. .054, TOT. .194

Order C.P. at same time

Time Req. One Month

Source Factory #10.

Min Batch - 38,000 - 40,000 lbs.

Uses Photography - Medicinal

Appearance White crystal Powder

Seasonal No

Remarks Send St. Louis:- 21% of each 1/4 lb. put-ups
23% of each 1 lb. put-ups

Principal Customers

Principal Contracts

Keeping Quality: Subd. 2 months Bulk 3 months
Deteriorates on exposure to humidity or heat

A2694

Figure 5. Control card used for 200 faster moving items which account for 75 per cent of Merck & Company's productive capacity

MERCK & CO. Inc. — PLANNING DEPARTMENT

Date January 14, 1938

PRODUCTION SCHEDULE

Article: CHEMICAL "B" (46502)

Size	FEBRUARY Production Units	Weight	Put up by	Approx. Time	MARCH Estimates Units	Weight	Available
1/4 lb.	38,000	9,500	as sched.	27 hrs.	38,000	9,500	Feb. 26
1 lb.	12,000	12,000	"	10 "	12,000	12,000	"
5 lb.	200	1,000	Feb. 19	-	200	1,000	"
25 lb.	25	625	"	-	25	625	"
100 lb.	25	orig.	as ord.	-	20	orig.	"
250 lb.	80	20,000	"	-	80	20,000	"
Reserve		5,000					
		48,125 lbs.				43,125 lbs.	
	Stock	63,175 lbs. L/L rel. 1/25 - 41,750 lbs.			Bal.	15,050 lbs.	
	Bal.	15,050 lbs.			Need	28,075 lbs.	

St. Louis
8,000 x 1/4 lb.

2,800 x 1 lb.

ORDER - 38,000 lbs.

100 lb. keg Stock 55 L/L rel. 1/25 - 10
Need 25
Bal. 30

100 lb. keg Bal. 30
Need 20
Bal. 10

ORDER - NONE

CHEMICAL "C" C.P. (46501)
Stock 194 lbs. L/L rel. 12/24 - 250 lbs.

ORDER - NONE

APRIL CONTAINER ESTIMATE

38,000 x 1/4 lb. - Mar. 18
12,000 x 1 lb. - "

6794

Figure 6. Production schedule prepared from information on the control card

Every Thursday the dispatch clerk prepares a machine-run program for the following week. Sequence of jobs is determined by stock on hand, similarity of containers, and cost of changing set-ups. Here, a view of Sodium Perborate packaging line

ment, where finished goods are stored, receives a copy so it may know in advance what space to reserve for incoming goods.

The foremen accepting these schedules, although allowed to carry out the work in their own way, are held responsible for completion by the specified date, and are required to notify planning just as soon as any hold-up appears likely.

Demands for many chemicals vary so widely from one season to another that it is often impracticable to build up equipment and a trained force to meet the peak load. In the interests of stabilization of employment and utilization of equipment, the planning department pays considerable attention to maintaining constant levels of production by accumulating finished stocks of stable products in the slack season.

Figure 7 shows a standard graph of a highly seasonal item. The sales curve shows peak demands during only three months, while the rest of the year's disposals are comparatively small.

Determining the ideal production level for such items is the first step after working out the sales curve. Some items may require a constant production rate every month throughout the year, while others may require a constant level for only six or eight months, after which time vacations, overhauls, or the possibility of using the same apparatus for other articles having different seasonal peaks, must be considered. The production curve shows a steady flow of work for seven months followed immediately by a gradual tapering off into the July and August vacation period.

The starting point of the line representing the accumulation of stock is the absolute minimum that should be carried. Stocks at each of the other points are found by adding monthly production and subtracting estimated monthly sales. Stock peaks are reached just as the production and the inventory start declining.

Lack of storage space or financial limitations may make such a stabilization plan impracticable, but whenever it can be adopted it is an important factor in lowering labor turnover, reducing pressure, and cutting down the expense of training green help in peak seasons. Proper planning has a decided bearing on creating steady jobs for satisfied employees.

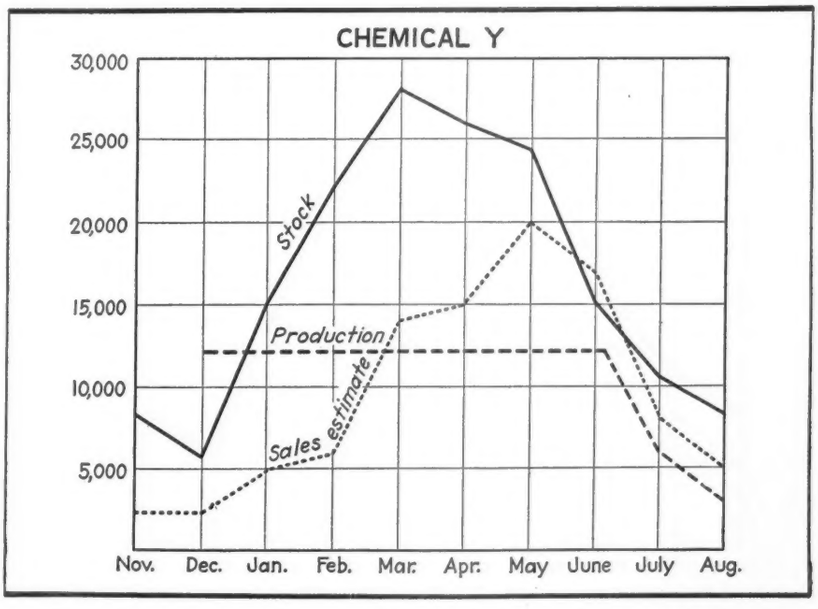


Figure 7. Graph for highly seasonal item shows how production was stabilized

Don't give the young college graduate some repetitive job he can learn in a day or two, and then forget all about him. Spend some time with him. See that he acquires an all-round knowledge of your business; he'll be more valuable later on

Fitting New College Men into

Answering These Questions

1. ***Why*** **should I hire a college boy?**
2. ***Which*** **college boy should I hire?**
3. **How do I *handle* the college boy?**
4. **How can I *train* the college boy?**

CLEMENT J. FREUND
Dean, School of Engineering, University of Detroit

WHEN YOU BUY A MOTOR, a pump, or a tool, an instruction booklet comes with it. You expect no trouble if you follow the instructions, and plenty if you don't. But when you hire a young engineering college graduate—an organism much more complex than any machine—nobody tells you a thing about handling him. No wonder some college boys fail to make good.

There are certain definite things you have to know about the college boy if you and he are to make progress together.

For instance, just what can the college boy do for you First, the best type of college boy is able to think, has been taught to think; he is intelligent above the average. Second, he is a skillful calculator; he can juggle formulas and equations.

Again, he understands instruments and how to use them. He can take measurements of almost any kind required in industry and get useful information out of his readings. He knows what is going on in the field of engineering and research, or at least he knows how to find out. After he becomes familiar with your business he can probably suggest which researches and developments mean anything to you. And his education has been such that you can quickly train him to handle some of those orphan jobs that do not seem to fit anybody in your organization.

On the other hand, you will find that the annual crop of June commencement jokes no longer mean a thing. The college boy of today is not cocky. He does not think he knows more than you or your best men. And he is not afraid to get his hands dirty. Times have changed. Jobs can no longer be had for the asking, and the college graduate knows it as well as anybody. He will be glad enough for a chance to do almost any kind of work.

The best way to get a good one is to go to a nearby college of engineering and pick him out. Perhaps you have never done that sort of thing

before. That makes no difference. Write to the personnel officer of the college and you will quickly discover that the whole thing is much simpler than you expected. The college officials will cooperate splendidly, will arrange the interview at your convenience, and will even help you through it if you want help. It should all take no more than a few hours.

Now what type of boy should you hire? I assume that yours is a small or medium-sized business. You will probably have the greatest success with a lad who has done some real work, one who spent a few years in a manufacturing plant before going to college, or lived on a farm and did his share of the toil, or found vacation jobs. The rugged, versatile type will fit into your business better than the intellectual, research type who belongs rather in the larger corporation.

Beyond that, you will undoubtedly do well to concentrate on those boys whose answers to your questions indicate that they are interested in you and your plant. One or the other may even have had experience that pertains directly to your business.

Ordinary questions and answers will be most useful, just as you naturally ask them and the students naturally reply. There are all kinds of employment tests, but they call for skillful administration, are expensive to use, and hardly practical when you need to choose only one or two young men.

If you are going to one of the larger colleges, do not wait until commencement or even until the middle of May. Employment representatives of the big corporations will have picked the class over long before that. In the smaller colleges, on the other hand, you will have less competition and you may easily discover just as capable a boy.

When you get right down to it, the handling of college boys is no different from the handling of other intelligent people. If you have no trouble with your accountants, salesmen, and superintendents, you should have none with the boys. But there are a few little tricks which will help.

Afraid of Getting Lost

If there is any one thing the college graduate is afraid of, it is losing his identity in your organization, getting lost in the crowd. Make it a point to talk to him at intervals about his work, about his plans for the future, about anything. And call him by name to prove to him that you know him. This will make him think the world of you and will gain his confidence.

Remember that his uncles and aunts and friends, and even his parents, may have age-old prejudices against manual work. They may think that the principal purpose of a college education is to rescue him from such degradation. Hence, if he works in your shop, give him a good locker, and place to wash up, so that he may appear in the streets like his friends who are young lawyers and physicians. That is not weakness, it is good sense.

As far as pay is concerned, give him the going rate for starting college boys in your community. Half of them get from $120 to $140 per month, at least in the Midwest; 80 per cent get from $100 to $150. And be patient. He will not earn every cent of his pay in the first month or two, perhaps not even in the first year. He is a long-term investment, and every corporation that has successfully trained college men has considered them as an investment. If you have chosen your man wisely, he will bloom in time and pay handsome returns.

Now what about the boy's training and experience? It is deadly, as everybody knows, to give him some little job, some repetitive operation he can learn in a day or two, and then to forget all about him. He will be most valuable to you later if he acquires at the start an all-round understanding of your business.

If yours is a metal-working plant, he ought to get some experience in the pattern shop, in the foundry, in the machining departments, in assembling, in engineering. He need not become skilled in all these departments, but he should help on some honest-to-goodness piece of work in each of them, so that he may respect the work and its complexity, and, more important, respect the men who do the work.

Regular apprentice training is without question the best way to accomplish all this—a carefully prepared program of supervised work, preferably outlined in some sort of document of which both the boy and you have copies. Appoint the boy himself to watch the time for transfer to new departments; he will surprise you by his alertness!

After he has been through the plant and office, let him settle down in some department where you need him and which he especially likes. Make that department his avenue of advancement.

Last, but not least, make him study, although he will probably get started on his own account as he runs into problems and difficulties. His college education is merely the beginning of the educational process, which continues during his entire career. Arrange his work so that he can attend night school or graduate courses. If neither is available, he must undertake an organized plan of reading and project work, not merely in engineering, but also in economics, psychology, sociology, history, and similar fields.

As you become interested in him and his progress—and you will—countless ways of helping him will come to mind. If you give him a little promotion every year or so, and a little increase in pay whenever he has earned it, and a little more recognition and responsibility, he *will* be making progress. So will you and your business.

Industry

The first college boy Clement Freund fitted into industry was Clement Freund. It was back in 1921 when he was a cooperative student at Marquette and got a job at Falk Corporation. He stayed there until 1932, for the last six years serving as a very busy director of apprentice training, education and personnel.

Available Now

1938 Index

to

FACTORY

SENT FREE ON REQUEST

•

Address the Editor

Figure 1. A simple demonstration. All the operator has to do is toss ten small blocks in the tray. But the five small sketches on page 52 show how hard she works

Sell the Operator

OFTEN IMPROVED METHODS are installed, or the attempt is made to install them, without selling them to the employees. Hundreds of better methods fail each month. Many fail because the workers resist them. Frequently the operator would be better off on the improved method, but how many times does he know the facts about the new way?

Does the engineer think in terms of selling the improved method to the employee? Not very often. Engineers deal with facts and figures. Salesmen deal with emotions—and a few facts. The engineer knows he is right and assumes that everybody else will agree with him, instead of appealing to emotions for selling his idea.

It has been my good fortune to work on a lot of improvement projects where the new method meant more money to the employee. One case occurred a few years ago when competition forced a firm to reduce the cost on a product. Improved methods were installed that reduced the labor costs 35 per cent. Fewer people were required. But how many were thrown out of work by this installation? None. Increased sales resulted in a second shift which absorbed those eliminated plus that many more.

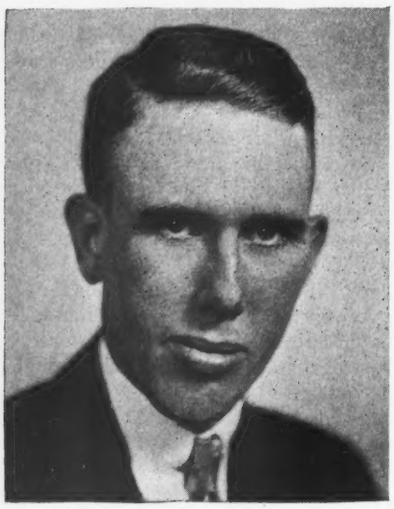
I have seen this same thing happen a number of times. I positively know that improved methods often result in more money to the worker. But how about the wage earner? Does *he* know? Engineers have all the facts and figures at their finger tips. But how about the operator? What facts does *he* have? He knows the rate was cut from say $2. to $1.30 per hundred units. That decrease is so big that he can seldom see anything else.

Take the case where more people were given employment instead of throwing some of them out of work. Hourly earnings were actually higher with the improved method at the lower rate. But how often does the engineer or management attempt to pass these facts along to employees or call their attention to them? How often does the engineer bother to explain why the rate was reduced, except to tell them that the improved method is easier, and that they can do more work?

In the past few years I have worked for a number of good firms in several industries. It would surprise the general public and the average wage earner to know the inside policies of these firms regarding cost reduction. They lean over backwards to be fair with the employee at a considerable cost to the firm in some cases. But how much effort do these same firms make to show the workers that their improved methods are fair? Usually they tell the operator that the improved method is easier. Now it certainly takes more than mere telling a worker that you have reduced his rate 25 per cent, and that he will do less work and earn more money. It is just a cut to him.

I am firmly convinced that a fair policy of installing improved methods is necessary and that it is practiced in most cases. But a good company policy loses much of its value when the employee is left in darkness about how the policy operates in reference to his earnings.

One firm not only maintains the



Before entering the industrial engineering field, Mr. McKeand's activities centered around the design of construction equipment, conveyors, and structural steel, and he served for a time as chief draftsman in a firm specializing in standardized steel mill buildings. His training in cost production started when he joined A. B. Segur & Company, industrial engineers. Since then, in his capacity of staff engineer, he has developed many employee-training programs—drafting, motion-study, supervisory, and "vestibule", to name some of the types. He has also devised employment tests for selecting piece workers, and carried on time-study research to develop fundamental time values. Factory's readers will recall his "Training the First Operator" which appeared in the August, 1935, issue.

Figure 2. Same job, but a better way. The backstop makes it unnecessary for the operator to look up and down. Sketches on next page illustrate improved method

on the Better Way

Improved methods are all to the good. You know what they do to hourly rates and weekly pay envelopes. But does the operator know? Your biggest task is to sell the man who has to do the job the new way

M. L. McKEAND

Industrial Engineer, A. B. Segur & Company, Oak Park, Ill.

policy of cost reduction, but has also set up a program to show employees how improved methods are worked out and why rates have been reduced. To carry out this educational program, groups of supervisors and pieceworkers were assembled once a week. Enrollment was voluntary, and the pieceworkers were paid for the time spent at these meetings. Moving pictures, charts, demonstrations, and lectures were used.

Motion time analysis and time study were used for setting the production standards. The company is in an industry where competition is keen, and it is necessary to be constantly improving methods and reducing costs if the firm is to remain in business. If the employees are to have work, costs must be reduced. In this plant, as in many others, standard methods had been set up for various operations, but much supervision is required to keep the operators following these methods.

In the meetings we used several demonstrations to show the importance of following the standard method. We had one of the members of the group volunteer to help with the demonstration. If one of them could handle a stopwatch, we gave him one to check the time. If not, we checked the time ourselves.

Figure 1 shows the layout of a simple operation that we often used. This operation requires about one minute to set up the improved method and a half minute to train the operator in the improved method.

Any small object may be used, preferably one that you have in your own shop—for example, small blocks of wood. We had the operator sit at the end of a table. Notice in front of her are ten small blocks of wood, scattered on the table, with a tray a short distance away.

For our first or present method, we allowed the worker to use any method she wished in tossing ten blocks with one hand, one at a time, into the tray. We timed this operation with a watch. Because the methods varied, we had a wide range of time for the operation. Average time was 10 seconds.

In watching this operation the members of the group could observe several things. First, the operator usually watched the article after it had been tossed to see if it landed in the tray. Then she looked down to locate the next block, then picked up the next block and tossed it. If the operator did not take her eyes off the tray and look down, she would have to feel around blindlly until the next block was located.

Figure 2 shows the layout of the improved method. The only change we notice is that a backstop has been placed behind the tray. She uses the same blocks, the same number of blocks, the same tray. But we showed the operator an improved method of tossing the blocks.

Does that make sense? An improved method of tossing blocks—about the simplest job possible to imagine?

How *could* you improve that operation? Well, do you remember that the operator watched the block after she had tossed it? Did that help? After she let go of the block, did she help the block fall into the tray by watching it? Then, remember, she looked down to locate the next block. In our improved method we spent half

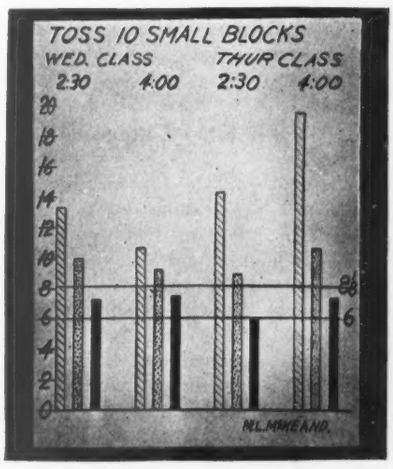
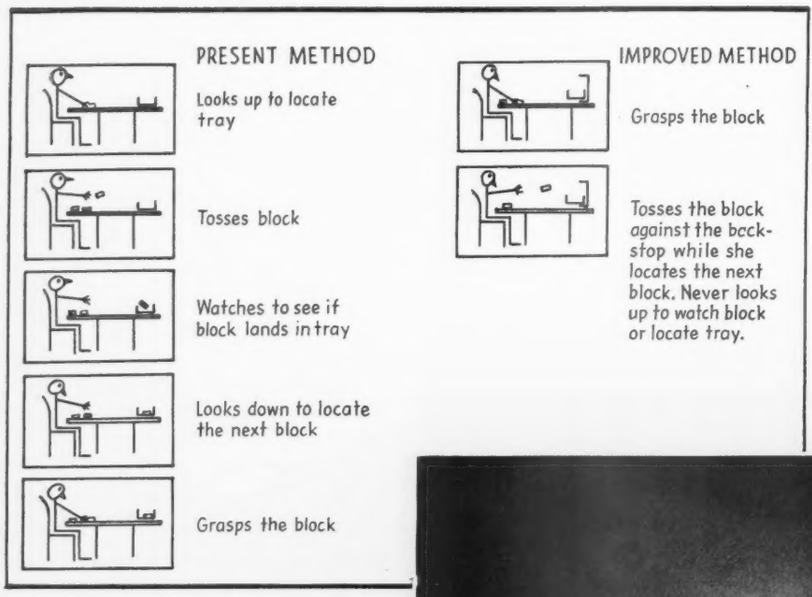


Figure 3. The results. Operator averaged 10 seconds tossing blocks her own way, 7 seconds the standard way


PRESENT METHOD
Looks up to locate tray
Tosses block
Watches to see if block lands in tray
Looks down to locate the next block
Grasps the block
IMPROVED METHOD
Grasps the block
Tosses the block against the backstop while she locates the next block. Never looks up to watch block or locate tray.

Follow the nose to see how much better the improved method is—operator no longer has to look first down, then up, for each toss. She can keep her eyes on the blocks, doesn't have to look where she's tossing. It's both faster, easier

a minute to teach her how to toss the block against the backstop and never watch it after it left her hand, but instead select the next block to be picked up and tossed.

We allowed the operator to practice tossing four or five times on this improved method so that she could learn about how high to toss them so that they strike the backstop and fall into the tray. Following the demonstration, we asked the group which method was the faster, as they could plainly see the difference in watching the two methods.

The time for this demonstration of the standard method is 7 seconds or 70 per cent of the usual time required for the operator's own method. The difference is only the way the eyes are used on the two methods.

An Easy Choice

We next said to the member who performed the demonstration for us: "On the standard method you earn 60 cents an hour, and when you did the job your own way, you earned 42 cents. Now would you rather do this job by your own method and earn 42 cents or by the standard method and earn 60?" This member as well as the others quickly agreed that the standard method was the desired method. We then emphasized that following the standard method benefited the operator because his or her earnings stood to be appreciably increased by it.

Figure 3 shows the results. There are four sets of time values, representing four members from four different groups. They were identified by 2:30 p.m. and 4:00 p.m. Wednesday class and 2:30 p.m. and 4:00 p.m. Thursday class. On the left-hand margin of the chart is a vertical row of figures representing the actual stopwatch time in seconds. The cross-hatched column represents the time taken by each member to toss ten blocks blindfolded. The center or dotted column represents the time required when each used his own method. The right-hand or solid column repre-

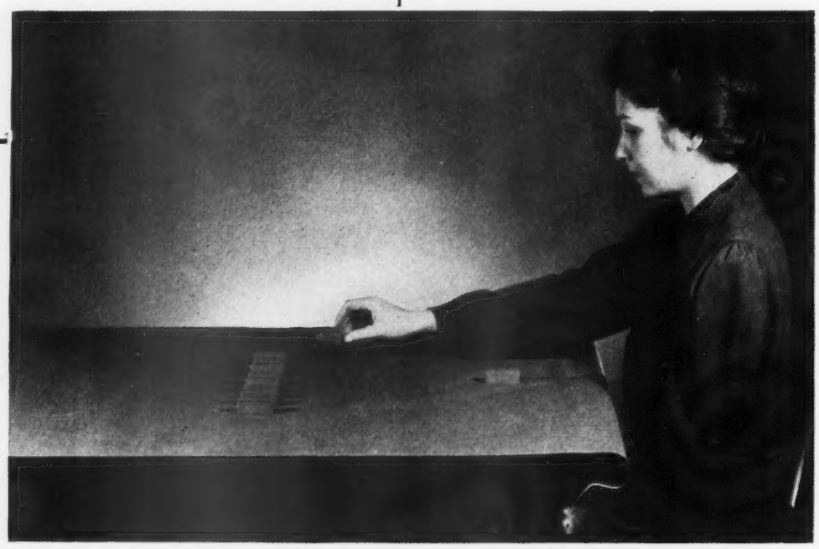


Figure 4. Just ten small red and green blocks spaced 2 inches apart. All the operator has to do is move them with one hand, one at a time, and set them down in a row 15 inches nearer. Average time, 0.11 minute

Figure 5. Now the same job, but this time the blocks are placed close together in a sheet-metal channel, first a red block, then a green one. Task is to grasp the red blocks by the sides and set them down 15 inches nearer the operator. The 100 per cent increase in time helps convince the operator that her way may be the hard way, and that the new method you're trying to sell is really an easier as well as quicker method

sents the minimum time required when the member followed the standard method.

Of course we don't expect factory employees to work blindfolded, but the comparison of the time values demonstrated that the eyes were an important factor in determining the time for tossing the ten blocks. We call your attention to the two cross lines on the lower part of the chart. The lower line at 6 seconds represents the faster time an operator would be expected to reach for this operation. One operator reached this base time without practice, while the other three ranged between 7 and 7½ seconds. The upper line at 8⅛ seconds represents the amount of time that would be used in determining production standards and setting piece rates.

We see that all four operations would have earned a bonus over the standard piece rate when they followed the standard method, but on the other hand all four would have earned less than their piece rate when they used their own method.

Next the job in question is studied by an analyst who makes a complete record of the operation and standard times for each small unit. This record is then analyzed to determine whether it is a well-balanced operation. Often the students will discover ways to improve the operation when they see the analysis of the job, and they will know that the time reduction was made by balancing the operation and eliminating parts of the operation that did not accomplish useful work. These students know how the system operates, and they could detect any speed-up if it was substituted. The fact that they follow the project and know how the improvements are worked out, eliminates much suspicion.

Developing a Project

Let us follow such a project. What operation shall we select? It makes little difference, since the principles apply to any operation. True, the wooden blocks in our tossing operation could be handled faster than hen eggs or glass tumblers. In fact, the time for moving the small wooden blocks one by one, say 15 inches toward the operator, will vary as much as 100 per cent, depending on how close together or far apart they are placed.

Figure 4 shows the layout of ten small red and green blocks, spaced about 2 inches apart. When this demonstration is used in a factory, some small article that the employees are used to handling should be used.

The small wooden blocks were moved by one hand, one at a time, 15 inches toward the operator, set down on the table, and released. The time required by the average operator was 0.11 minute.

Figure 5 shows the same layout except we take each red block and place it between green blocks of the same size. The blocks are placed close together in a small sheet-metal channel so that the operator cannot pick them out by the ends, but it forced to grasp the sides of the blocks. This grasp was made difficult because the blocks were close together. There are several ways of grasping the red blocks, but any method requires twice as long to move the ten red blocks 15 inches toward the operator. The 100 per cent difference in the time is another reason for thinking twice before letting the operator do the job his own way rather than by the standard method.

(The second half of Mr. McKeand's article on selling the better method to the operator will appear in May.—Ed.)

To Help You Arbitrate

Settling labor disputes by arbitration is no new idea, but management and men often overlook it simply because they don't know that the machinery is all set up, that impartial arbitrators may be had for the asking

J. F. ANDREWS
Assistant Editor

WHAT'S BECOME OF ARBITRATION? Does anyone arbitrate in this era of strikes? Is a strike the inevitable consequence of an impasse in management-labor negotiations? If not, how does one go about arbitrating after all attempts at mediation have failed?

Because industry was headed for greater need of arbitration facilities as unions became more prevalent and obstinate under the encouragement given them by the National Labor Relations Act, the American Arbitration Association in October, 1937, inaugurated its Voluntary Industrial Arbitration Tribunal to serve in preserving industrial peace. Already it has arbitrated more than 100 disputes. Application of its method of settling the questions bound to arise between management and labor is entirely voluntary, but the method is designed to be so impartial and easy to invoke that it must appeal to both parties.

One case settled under its auspices involved discharge of an employee for incompetence. The union had asked that the man be reinstated and transferred to a less responsible position. When the case was brought to arbitration, the arbitrator denied the union's request on the ground that such discharge did not violate the labor agreement, and that to grant the request would add to the employer's expense by reason of loss of efficiency.

When a knitting mill and union found themselves unable to reach an agreement over the layoff of eight employees during an alleged slack season, both parties selected an arbitrator under the rules of the VIAT. The company claimed lack of work, while the union contended that the layoff was arbitrary, that if there was lack of work it was due to the company's action in farming out work to another mill, and that if there was actual shortage of work employees should share evenly what there was.

The arbitrator found that there was a shortage of work, that the evidence did not support the contention that orders were being farmed out. He also decided that where the work, when spread among the entire crew, did not

(Continued on page 104)

THE ABCs of PERSONNEL

Check yourself on the G's and H's—they hold tips no one in the organization can afford to ignore. Next month, the I's and K's

CHARLES S. STEVENSON

General Manager, Hall Brothers, Inc., Kansas City, Mo.

SKETCHES BY ORIN W. LOO

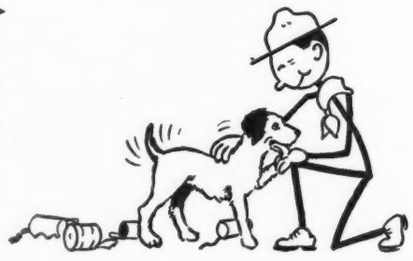
Generosity

Generosity is not necessarily associated with money. The offer of a ride home, the gift of a magazine you have read, the sharing of a newspaper, an unexpected compliment, praise for an idea . . . these come under the heading of generosity. When money is a question, how little is the cost of an occasional soft drink, a cigarette, the offer of part of a candy bar, the sending of a birthday or sick card, and the like. Caution: *Be certain your generosity is natural!* Do not be patronizing, and make sure that you show no evidence of favoritism. Generosity in a sensible application is an exceedingly desirable asset for folks in executive positions . . . and the dividends from it are pleasant ones.

Golden Rule

The apostle Matthew would have made an outstanding personnel man. His Golden Rule is perfect for handling people, and is effective with every race, in every creed, and under all circumstances . . . "*Whatsoever ye would that men should do to you, do ye even so to them*" . . . in the language of the plant: Treat the other fellow as you'd like to be treated. If you handle your personnel problems with Matthew's philosophy you'll make very few mistakes!

Gratitude



A guest in a home overheard a father struggling with his ten-year-old son over the latter's slowness in acknowledging a birthday gift sent by an out-of-town uncle. The parent later said: "In a position to do many small favors for a great many folks, I am constantly appalled by their lack of gratitude. I expect that in their minds they are probably appreciative, but as I told my son, unless his uncle is told, or written, or can be shown, of the boy's appreciation, he will never know of it." I intend to teach my youngster to *show* and *express* his appreciation for favors done if it's the only heritage I give him." Psychologists say that persons who have the thoughtfulness to express their appreciation are in the "good personality" groups . . . would *you* qualify?

Health

"I cannot figure out whether successful men are healthy or healthy men successful," someone remarked to an executive. "Neither is quite true!" he answered, "but I've noticed that in men achieving success under fifty you generally find good health playing a vital part in their advancement." An observation: In all plants and offices those certain few with pains and aches get the sympathy of their fellow workers, but the fellow workers generally get the advancements. A leading physician has said that proper exercise, the right diet, fresh air, and enough sleep are all that are needed to assure a person of the precious asset of good health . . . *all these are free* . . . to anyone . . . yet how many persons pay physicians *to get well* . . . and how few take advantage of these free requisites to *keep* well?

Hygiene

Only a small portion of your anatomy is exposed to public view, but the care of what is seen is of utmost importance. For example, is your hair cut regularly? Is your skin fresh and healthy-looking, or is it dull and soggy? Gleaming teeth are very pleasing and definitely a personality factor. The condition of a small boy's neck is a laugh provoker . . . what would a study of adults' necks develop? To have clean finger nails does not call for a manicure. There's very little expense to proper care of exposed parts, and considering their importance, it would seem that words of caution would be needless. Strange, however, how easily the most obvious of things are overlooked!

Objectives in Foreman Training

In foreman training it is easy to lose sight of the forest because of the trees. So here is a terse outline for an overall check-up of the broader aspects and objectives

Prepared by

G. O. FRAMPTON

Industrial Consultant, E. Aurora, N. Y.

FOREMAN TRAINING is processing man power. It is a job in which as yet we are able to use few straight-line production principles. It is somewhat of a job shop business, with all the difficult angles that are always to be encountered in that type of production.

The Foreman's Wants and Needs

Like every other plant operating executive, the foreman wants and needs the following:

1. He wants to be able to think better.
2. Plan better.
3. Manage himself better.
4. Handle men better.
5. He wants to know the principles behind the practical work.
6. More about how the world lives and makes its living.
7. He wants to forge ahead faster.
8. To know more about what the whole organization is trying to do.
9. More about human nature.

These are the things the company wants for him, too. Here, then, are nine angles that must be considered in building a foreman training course.

Analyzing the Problems

Some kind of finished product is expected of foreman training. In a sense, it is a production problem and can be approached as follows:

1. Objective to be obtained by training.
2. Sound requirements for obtaining that objective.
3. Methods to be employed.

The Training Objectives

What do we expect to accomplish? What is the finished product to be? The objective of the training course must be considered from the company's viewpoint and from the foreman's.

So far as the company is concerned, we can ask two questions: Why should the company train him? What can the company hope to accomplish by this training?

Here are some of the answers. The company wants (1) a stronger organization, (2) better cooperation among its executives, (3) greater loyalty, (4) steady, safe growth, (5) more economical production, (6) better quality, (7) less waste of energy and materials, and (8) a larger net profit.

From the foreman's angle there are likewise two questions to ask: Why should he train himself? What can he hope to accomplish?

Here are eight answers. The foreman wants exactly the same things the company wants. We have just enumerated them. The training course must therefore be one that will develop the foreman so that he grows into a larger earning power and usefulness right on the job. It must also teach him the fundamentals that are necessary in order to make a larger net profit and a larger, safe growth for the company.

Fundamentals of Company Growth

The foreman must therefore be taught the fundamentals that:

1. Underlie real executive ability.
2. Apply to organizing an industry.
3. Are concerned in producing at a profit.
4. Enable us to use records as planning, controlling, and directing mediums.

5. Are involved in the reduction of waste.

6. Are involved in the control of production.

7. Control the sale of the product at a profit.

Economic Measuring Tools

Every foreman has tools and gages to measure the size, shape, and proportions of the product. Few foremen have the background for gaging what trends certain industries will take or that departments will take in the event of a major mechanical, chemical, or economic change. It is therefore necessary to teach foremen the following fundamentals:

1. *Industrial Economics*—This gives him an industrial background. Here he learns what has gone before in industry. It helps him to sense what is liable to happen in the event of a major change in the principles upon which an industry is built.

2. *Industrial Leadership*—Here the foreman learns the price to be paid for leadership. Here he discovers that there are certain fundamentals which, if known and followed, will automatically lift a man out of the crowd.

3. *Planning a Successful Life*—Life is planned with its minor sub-assemblies and its major ones, as well as its final assembly, in much the same manner as the product is planned in the plant.

4. *Right Thinking*—Here the foreman learns to do most of his thinking in principles. A real intellect is built of impressions that are properly processed by thinking them through to the end and forming a judgment from them.

5. *Building a Stronger Personality*—The foreman learns to keep his shortcomings in the background and to lead from his strong suits. Thus he is able to sell his best qualities, get better self-control, and gain the respect of his men.

6. *Accumulated Habits*—Here the foreman learns that most of life and its actions are the result of accumulated habits that unconsciously color all our impressions. If he is to manage men successfully, he must control thoughts, actions, and habits.

Fitting the Foreman into the Picture

How does the foreman fit into the industrial picture? By doing his work. A foreman training course must therefore include elements that will enable him to do his work in a larger way. This can be done by breaking down his job into its components. There are nine major angles to be considered:

1. *He must know his equipment* so that he can get the maximum production from it without undue wear and tear on it.

2. *He must work his floor space* so that his flow of raw, semi-finished, and finished materials is timely and economical.

3. *He must handle materials* in the most economical manner, route them properly, process them properly, store them conveniently while in process, and dispose of them quickly after processing.

4. *He must utilize power* so that he uses what he needs, has always enough available, but does not waste it.

5. *He must supervise and inspect* men, machines, tools, operations, materials, safety devices.

6. *He must handle records* so that he knows at all times what is coming up, what he is doing, what he has done and what is planned ahead.

7. *He must take care of safety and welfare* in such a way that he helps safeguard the lives and health of his crew.

8. *He must manage himself* so that, while he is constantly in action, he keeps enough reserve back to keep him well balanced and poised at all times.

9. *He must handle men* so that his department turns out a fair day's work, at a fair day's pay, with a fair day's overhead.

Some Definite Conclusions

1. The real way to develop a man is to give him a larger vision than he has now, and to place within his reach the means of attaining that vision.

2. A foreman can absorb a great deal more training material than most people think.

3. Men are willing to attend sessions only when they are getting *something they want.*

4. Unless sessions are controlled by pre-arranged outlines of a very definite character, it takes a versatile leader to direct the activities of the group in such a way that the foremen will get any value from the sessions.

5. There is no place in industry for the professional spellbinding inspirationalist who talks about the whole world and wants it in the course, and whose lectures the foremen forget tomorrow.

6. Every session must be scheduled and carried out as a separate yet connected step in a well laid out, intelligently directed, carefully controlled course. The course should lead to a definite end.

7. Each foreman must carry away definite information he can use tomorrow. He wants usable information right now. He is an action man.

8. Each must carry away a serious thought of the value of the 24 hours in each day.

9. Each one must carry away a greater desire to put more into work and life in order to get more out; also the desire to have his crew do likewise.

10. Sessions must be complete units of training, each so valuable that alone it builds for growth, and that together they make a real plan of life and become a guide for management.

11. The foreman will not go back to kindergarten. That is why much of the material now given him does not interest him.

12. The more a foreman learns of the whole business in which he is engaged, the less you make a general manager out of him. But he does get a greater realization of just what it takes to be a real general manager or general superintendent. And he learns to know one when he works for him.

Quick Ways to Profits

Operating Shorts for Operating Men

PRODUCTION METHODS AND MATERIALS

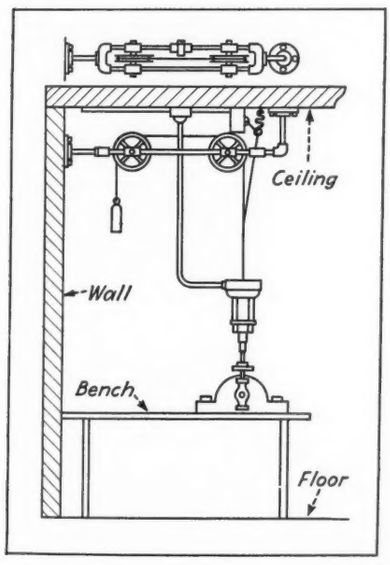
Drill Rig Saves Motions and Repairs

L. G. FRANK, *Irvington, N. J.*

An electric drill fitted with a nut-tightening socket wrench is used in assembling valves. Formerly, the drill was laid down on the assembly bench after each operation, and, since one operator assembles about 1,000 valves a day, the drill took considerable abuse. The switch frequently went out of order.

Now, with the set-up shown in the sketch, switching by hand is eliminated, and the drill is kept suspended in position over the valve assembly.

A frame made up from ½-in. pipe and fittings, and secured to the wall



and ceiling, carries two 4-in. metal pulleys. These pulleys are mounted on ⅛-in. brass pipe shafts set at right angles to the two parallel sides of the frame, and are joined to the frame by tees. Over the pulleys runs a ¼-in. steel rope on one end of which hangs a 4-lb. sash weight and on the other the electric drill.

A switchbox inclosing a 6-amp., 125-volt toggle switch is mounted on the ceiling. In the metal toggle ball a small hole has been drilled into which one end of a steel coil spring and one end of a piece of steel piano wire have been set. The other end of the spring is secured to the ceiling; other end of piano wire to steel rope on which the drill is hung.

As the drill is brought down toward the valve stem, the switch is pulled on. When the drill is released, the spring snaps the switch off.

One precaution had to be taken—to mount the switch on the lower part of the switch plate, so that the spring would exert enough force to keep the switch normally open.

At the end of six months of operation no repairs have been necessary.

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Removing Scale from Spray Nozzles

SOURCE
Textile World

Scale formations in the spray nozzles of air conditioners seriously interfere with the proper functioning of the equipment. This scale is mineral matter deposited by the spray water, and consists primarily of the carbonates of calcium and magnesium or, in every-day plant parlance, lime.

Deposits of this nature can be partially controlled by frequently draining the spray pan and refilling with fresh water. Most industrial waters contain some mineral matter, and, when the spray chamber is acting as a humidifier, this water is continually evaporated and more water containing dissolved solids must be added to take its place. However, the impurities are left behind in the evaporation process and gradually increase in concentration until they begin to precipitate out of solution in the nozzles. Draining and refilling removes the water containing concentrated solids and substitutes relatively pure fresh water.

When the nozzles do become fouled, they can be removed from the conditioner and soaked in a commercial hydrochloric acid (muriatic acid) solution made up of one part acid and one part water. When all scale is dissolved, the nozzles should be immediately taken out of the acid and washed thoroughly with water to minimize action of the solution on the metal.

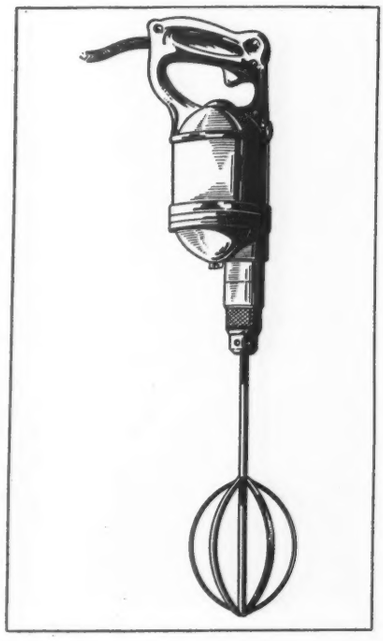
•

Electric Mixer for Liquids

S. R. TERANES, *Two Rivers, Wis.*

To mix up a small batch of glue or other patching material, here is a simple device that will do a better job of mixing, and save time.

Several strips of metal have been welded to a piece of ¼-in. rod. Even



bending the rod into a loop at the bottom will suffice. With the other end of the rod set in a portable electric drill, the mixer is ready to go.

Feed cam on an automatic screw machine in an automobile parts plant used to operate 6 to 12 weeks. Edge of the cam was hard-faced at a cost of one-quarter that of a new cam, and the life was extended to one year.

Machine Tool Comes to the Work

SOURCE
Electro-Motive Corporation, LaGrange, Ill.

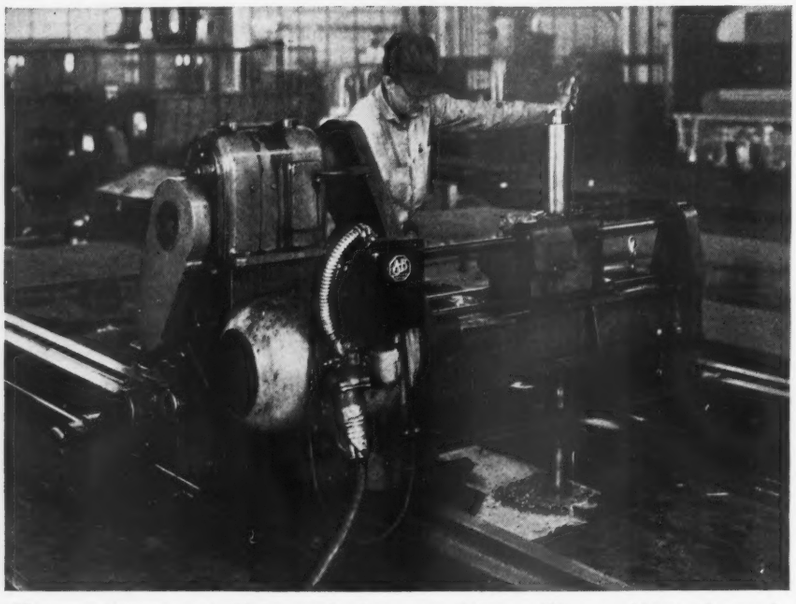
Bringing the machine tool to the work because the work is too large to bring to the tool is a recent development at this plant. The method has substantially decreased costs on one operation.

The engine base on which the power unit of a diesel-powered switching locomotive is mounted consists of several steel blocks. These blocks are welded to the locomotive frame. In the process, it has been found impossible to set the blocks without getting them slightly out of level with one another.

Formerly, these blocks were hand ground to a straight edge. The job was hard work, required an amount of skill, and took an unpredictable amount of time—sometimes as much as a week. It took place necessarily after the blocks had been welded into place.

Now the work is performed by a milling machine that is moved into place by the crane serving the bay. This miller is no ordinary portable tool. It is a 72-in. miller traveling 16 feet.

First the rails of the miller base are set in place on the locomotive body, above the work. Then the upper part of the miller is set on these rails. With the machine thus in place, the upper surfaces of the engine base are finished to the required straight edge in short order. Time required for completing the locomotive has been greatly reduced, and the costs of the operation are but a small fraction of what they were by the hand grinding process formerly used.



The mountain comes to Mohammed when crane brings milling machine to the work

Old Stator Used to Demagnetize Gears

H. W. BOHNE, *Jackson, Mich.*

Several years ago we bought a rotary surface grinder. When a few thousand gears that had been finished on it reached the final inspection department it was found that all were magnetized and could not be shipped out because there were small steel slivers all over them.

To save these gears and others coming from this grinder, I removed the endbells and rotor from an old 30-hp., 3,600-r.p.m. motor on which one phase had burned out. The stator was connected to a 220-volt, single-phase line, and our troubles were over. The gears were demagnetized simply by passing them though the stator. Later a signal lamp was installed between the switch and the stator, to remind the operator not to go away and leave current on.

An entire day's output of gears from two grinding machines can be demagnetized in about two hours.

Satisfies Underwriters

In the manufacture of automatic sprinklers, Underwriters' specifications that previously could not be met were satisfied by one manufacturer through the use of a plastic molding compound.

Blending Time Halved

Modernization of the mixing equipment in a large chemical plant halved the total time consumed in blending 0.5 per cent of a total formula into a mixture. A record of the old and new methods revealed the following facts:

	Old	*New*
Mixing time	3 hr.	½ hr.
Testing	3 hr.	3 hr.
Cleaning and drying...	4 hr.	2 hr.
Charging and unloading	2 hr.	½ hr.
	12 hr.	6 hr.

Used to Last a Month, Now It Lasts 18

A machine for bending ¼-in. square steel bars into an arc of 3-in. radius is equipped with a dog and ratchet that disengage during each bending operation. Formerly the ratchet teeth were torn so badly by the action of the dog that the ratchet became useless within a month's time. A special wear-resistant, cobalt-base, hard-facing alloy was applied to the ratchet teeth, and on inspection after 18 months' service, the ratchet was found to be still serviceable.

Warm Patterns Up Output

Electrically heated patterns raised production 10 per cent in one foundry. The warmth tends to dry the sand around the pattern and thus gives a perfect mold. Heaters are built right into patterns, where they are not so likely to be damaged.

POWER AND LIGHT

Two Sources Insure D. C. Excitation for Motors

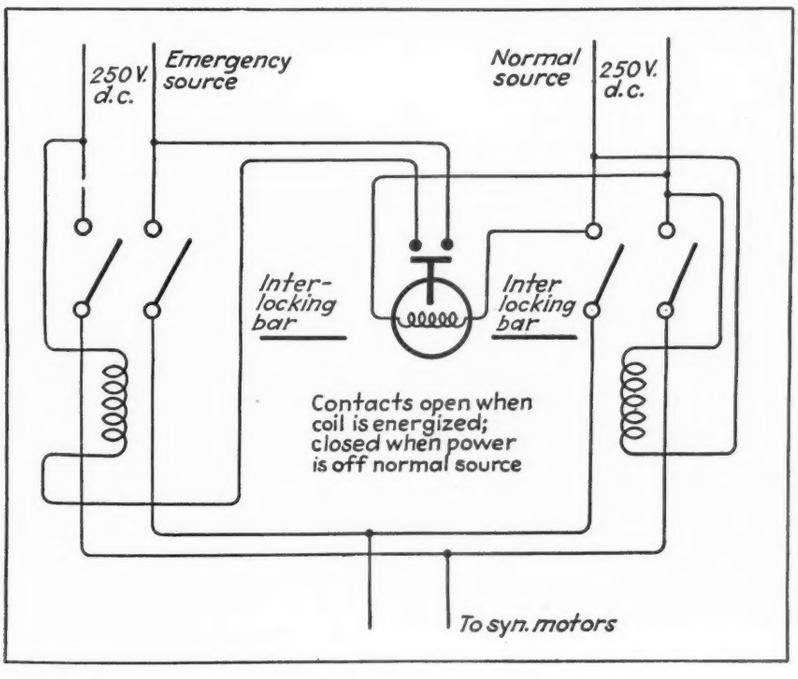
LEO BENEZE, *Godfrey, Ill.*

A considerable amount of direct current is used in our plant, for driving certain machines powered by d.c. motors and for the excitation of four 150-hp., 2,300-volt synchronous motors. Excitation for these motors was supplied by a 100-kw. m.-g. set which also fed a number of separate circuits. In each instance the d.c. supply for the synchronous motors was taken from the d.c. line at the point nearest the motor.

With this arrangement it is obvious that when the main circuit breaker on the d.c. generator of the m.-g. set tripped out on overload all four of the synchronous motors stopped. An outage of only two or three minutes often caused a delay of an hour in getting production back to normal. Of course, when the breaker protecting one of the separate group circuits opened, only one of the synchronous motors was affected, and only machines driven by that motor stopped.

To reduce the number of outages it was decided to change the existing arrangement so that excitation could be supplied from either of two m.-g. sets, with automatic transfer to the second set, which provided power for a small locomotive, in the event of failure or trouble. For this purpose we employed an old solenoid-operated panel formerly used for reversing duty on a planer table. The panel was cleared of everything except two two-pole 100-amp. contactors, with the interlocking bar. As shown in the sketch a separate line was installed to serve the four synchronous motors.

This scheme has been in operation for three years, during which time there have been no outages, or trouble.



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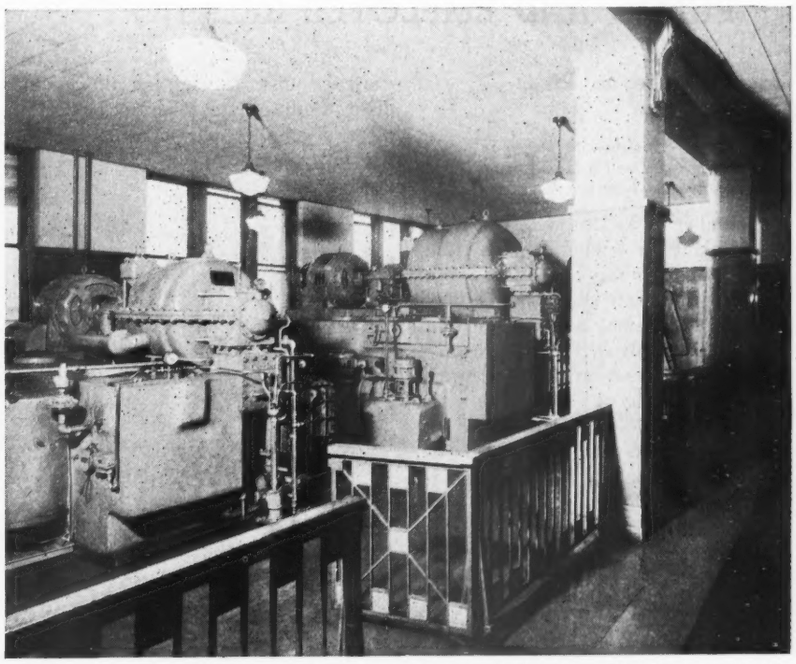
Acoustically Treated Engine Room Ceiling

SOURCE
The Celotex Corporation, Chicago

To reduce noise of high-speed machines, Brewing Corporation of America, Cleveland, applied perforated, sound-absorbing tiles to its engine room ceiling. Noise was cut down so far, it was possible to determine which machines were making the greatest noise.



Engine rooms are notoriously noisy places, but sound-absorbing tiles have made this one so quiet you can identify noises of individual machines

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Resistor Prevents Motor Field Burnouts

J. L. DARLING, *Electrical Foreman Nos. 2 and 3 Merchant Mills, Inland Steel Company, Indiana Harbor, Ind.*

When the 14-in. mill was built in this plant 230-volt, d.c. compound-wound motors were used for most of the table and auxiliary drives. These motors range from 5 to 45 horsepower.

From the time they were put in operation we had an excessive number of field burnouts on these motors, because the fields were energized continuously. The line voltage was held close to 250 volts, while the motors

were supposed to stand up to 260 volts.

A slow-burning insulation was tried on the coil windings, but it did not improve matters. Then we installed an auxiliary contact on the line contactor on the control boards to cut a 250-watt, 225-volt resistor in series with the shunt field when the motor was not operating.

This arrangement made it possible to maintain partial flux in the field continuously, preventing an excessive rush of armature current when starting the motor. Also, motor temperatures have been reduced, since less heat is now developed in the fields and the idle periods give them a chance to cool off.

Most important of all, burnouts due to fields overheating were reduced about 80 per cent. In addition, there is a saving in field current of 20 to 60 per cent, depending on the frequency and length of operation.

PUBLIC AND EMPLOYEE RELATIONS

Safety Device on Press Saves Fingers

VICTOR HAROLDSON, *Foreman*
Mount Vernon Die Casting Corporation
Mount Vernon, N. Y.

A number of kick presses are used in our plant for trimming flash from small, zinc-base die castings. These presses seemed safe enough when they were installed, since no great amount of power is involved, but in a year or so of operation several hand injuries were sustained by the operators.

The safety device shown was installed two years ago. It consists of two spring-actuated pins that normally fit into holes drilled in the plunger, preventing the die from descending.

Two levers, one on either side of the press, must be held down to withdraw the pins, allowing the plunger to drop. Both of the operator's hands must be used to hold down the levers, which keeps them well out of the danger zone.

There has not been an accident on the presses since these safety devices were installed.

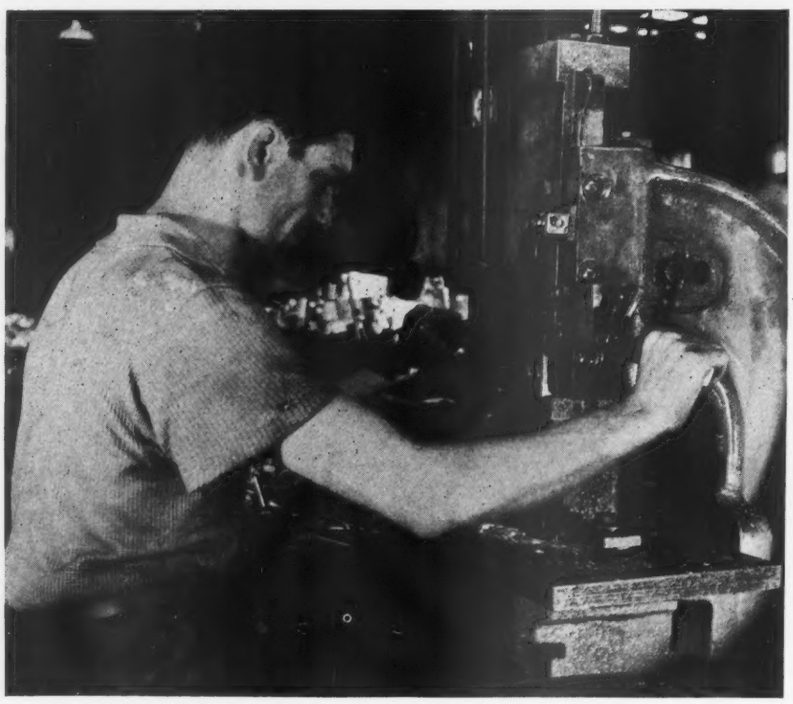
•

Pays to Publicize Policy

One of the companies in the van in reporting company policies to employees found two outstanding effects from this practice:

1. It tends to create greater consistency on the part of the supervisory organization in making decisions affecting people.

2. It provides those who are not supervisors with certain standards of treatment that they have a right to expect.



Plunger can't drop until both levers are held down. Hands are out of danger then

•

Traffic Standards Aid in Accident Prevention

S. H. COLEMAN, *Roanoke, Va.*

Movable traffic signs of the type having a heavy base surmounted by a short post to which is fastened a metal plate bearing legends such as No Parking can easily be converted into very valuable plant safety equipment. Without alteration other than painting on the proper warning these stands, if strategically placed in danger spots, will do much to prevent accidents and injuries to vehicles and persons on roadways, walkways, and around dangerous operations. Typical uses are as stop signs at intersections, danger signs placed in walkways crossing railroad tracks, no-smoking signs at the entrances of restricted areas, and indicators directing traffic to various points.

By attaching rings through which guard ropes can be threaded, these markers will help to reduce accidents on maintenance and construction work. They make ideal standards for roping off floor areas while work is going on overhead, or as temporary fencing for excavations and similar jobs requiring this form of protection, especially since it is possible by means of interchangeable legend plates to denote the particular hazard that exists.

•

We Post the Scores

JOHN F. PIERCE
Director, Office Service Department
Tennessee Valley Authority

Everyone likes to know how good he—or particularly she—is. Hence our simple plan of posting scores made on stenographic tests.

We have specific requirements of speed and accuracy in typewriting and shorthand for our stenographers and typists. A qualifying grade on these tests is a prerequisite for entrance into certain salary classifications.

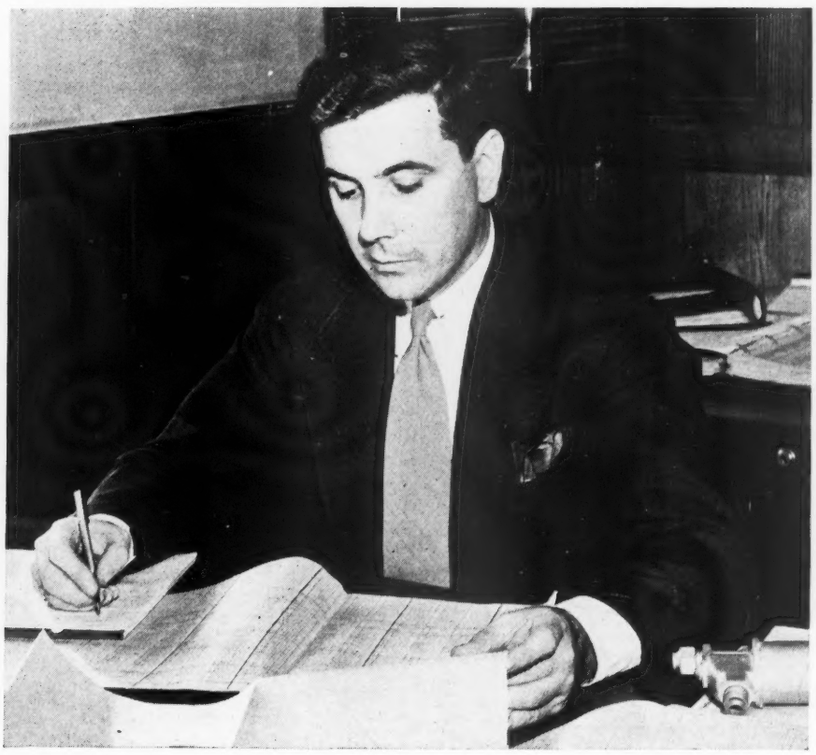
Because it was of common interest, we began posting an honor roll showing the test standings of those who had made qualifying grades during the period. Keen interest was thus stimulated, and test grades became a matter of personal interest. Getting on the honor roll was one more thing to strive for.

A Maintenance Budget? Why Not?

Anyone who thinks he can't budget maintenance expense has only to look at Detroit Lubricator Company to learn he's wrong. Ten years ago this concern found maintenance costs too high, has budgeted them ever since

D. BLACK

Budget Director, Detroit Lubricator Company, Detroit



The author at work on a budget

TOTAL MAINTENANCE EXPENSE in our company is about 5.5 per cent of total overhead costs. With 70 people in the maintenance department, however, the total expense is large, and would quickly get out of hand unless carefully controlled.

To control it we use a budget. This means that we must look ahead before making an expenditure, repair only equipment that will be needed for future production, and make necessary expenditures at such times as the financial position of the company permits. Certain portions of maintenance expense, such as watchmen, may be regarded as fixed, but, in general maintenance must keep step with all other plant expenses in the coordinated budget under which the plant operates.

In operating our maintenance budget, maintenance expenses are divided into two groups—general and special. General maintenance represents the continuing items, such as cleaning windows and floors and oiling machinery; special maintenance consists of the irregular items, such as repairs to floors and machinery.

General maintenance represents work that can be charged directly to the department in which the work is done Consequently its cost appears in the departmental monthly budgets. Special maintenance cannot be charged to specific departments in this way; hence it is not part of departmental budgets.

The plant engineer, who is in charge of maintenance, is naturally more familiar than anyone else with the technical needs of the plant. On the twenty-fifth of each month he draws up an estimate of what he considers must be spent on special maintenance items during the next month. In this estimate he is aided by periodic inspection reports of plant facilities. This estimate is broken down into amounts to be spent on various classifications of maintenance labor.

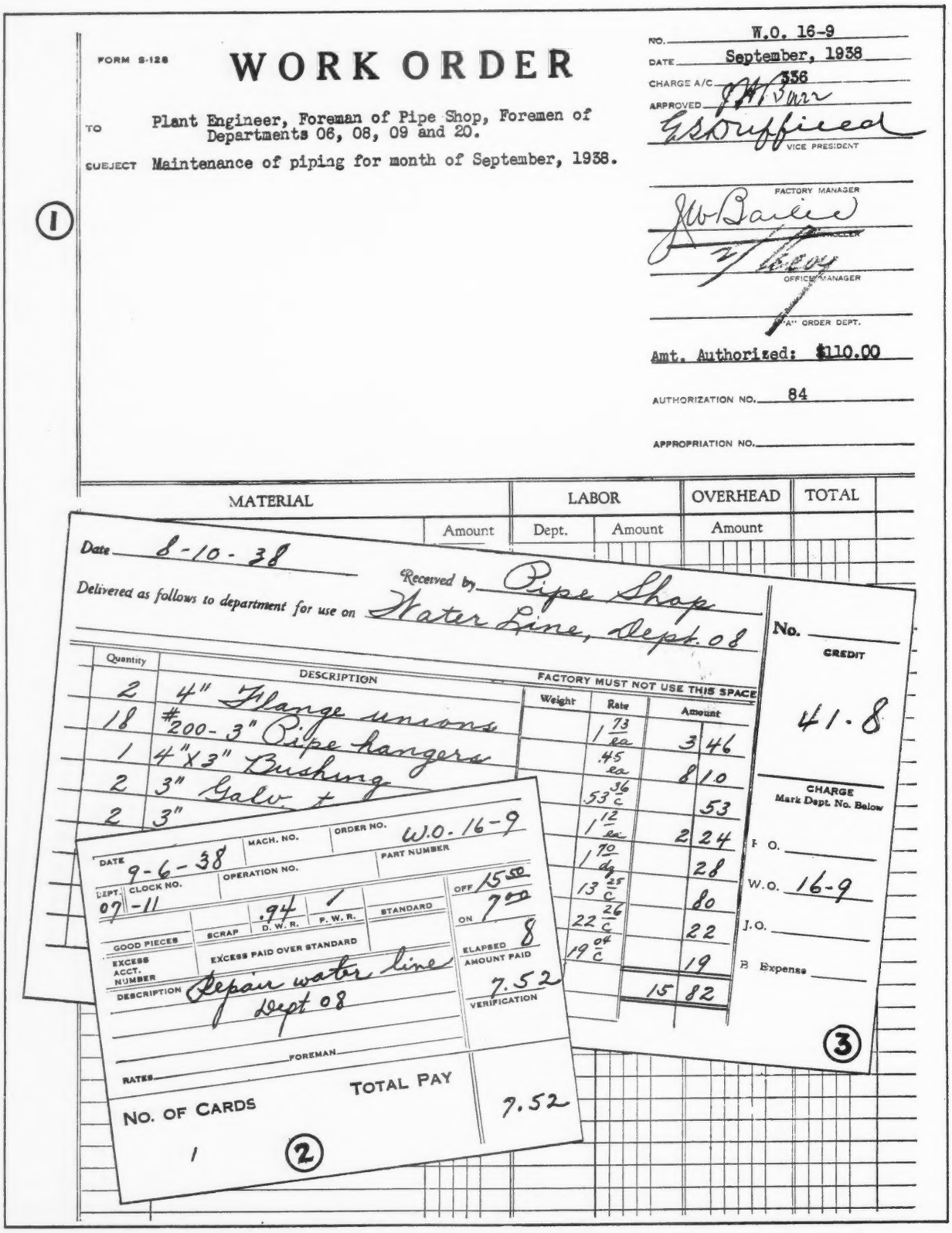
In addition to this estimate of special items, the plant engineer also estimates what amount will be required to run his own department. This consists of payroll estimates for every class of labor included in the department. The amount he specifies is what he considers should be spent for general or continuing maintenance, and if approved is equal to the total of the amounts the budget department allows for maintenance in all departmental budgets.

Other Facts to Consider

The total of these estimates by the plant engineer furnishes management with an expert opinion of what 100 per cent maintenance will cost. It must be tempered by a knowledge of other pertinent facts about the business before a decision to go ahead can be given, especially a go-ahead on the special items. These additional facts have to do with manufacturing activity expected during the next month.

Production figures originate in the sales department where a statement is prepared of the expected monthly sales for each of the company's products—valves and controls for heating and refrigeration. Since sales estimates are made for the calendar year, as well as for each month, these forecasts are revised each month, as a result of studies of trade conditions, trends in customer industries, past experience, and general plans of the company, such as introduction of new products. A similar checkup is made at the end of each quarter to determine the advisability of revising figures for the remaining months of the year.

These figures must be set in conjunction with the production department, of course, for plant capacity may need to be adjusted. In any case, the inventory position at the beginning and end of each period must be decided before it is possible to state the flow of



FORM S-128

WORK ORDER

NO. W.O. 16-9
DATE September, 1938
CHARGE A/C 336
APPROVED
VICE PRESIDENT

TO Plant Engineer, Foreman of Pipe Shop, Foremen of Departments 06, 08, 09 and 20.

SUBJECT Maintenance of piping for month of September, 1938.

FACTORY MANAGER
OFFICE MANAGER
"A" ORDER DEPT.

Amt. Authorized: $110.00

AUTHORIZATION NO. 84

APPROPRIATION NO.

(1)

MATERIAL		LABOR		OVERHEAD	TOTAL
	Amount	Dept.	Amount	Amount	

Date 8-10-38

Received by Pipe Shop

Delivered as follows to department for use on Water Line, Dept. 08

No.

CREDIT

41.8

Quantity	DESCRIPTION	FACTORY MUST NOT USE THIS SPACE Weight	Rate	Amount
2	4" Flange unions		1.73 ea	3 46
18	#200-3" Pipe hangers		.45 ea	8 10
1	4"x3" Bushing		.53 36 C	53
2	3" Galv. t		1.12 ea	2 24
2	3"		1.70 dz	28
			13.25 C	80
			22.26 C	22
			19.04 C	19
				15 82

CHARGE
Mark Dept. No. Below

P. O.

W.O. 16-9

J.O.

B Expense

(3)

DATE 9-6-38 MACH. NO. ORDER NO. W.O. 16-9

DEPT. 07 CLOCK NO. 11 OPERATION NO. PART NUMBER

OFF 15 50
ON 7 00
ELAPSED 8
AMOUNT PAID 7.52

GOOD PIECES | SCRAP .94 | D. W. R. | F. W. R. 1 | STANDARD

EXCESS ACCT. NUMBER | EXCESS PAID OVER STANDARD

DESCRIPTION Repair water line Dept 08

VERIFICATION

FOREMAN

RATES

NO. OF CARDS 1

TOTAL PAY 7.52

(2)

Figure 1. Work order covers one item of special maintenance for one month. When approved, accounting department authorizes maintenance to proceed with the work by issuing condensed copies to individuals concerned, then keeps costs in line by refusing to accept charges that do not appear on face of the order, or in excess of amount authorized. Figure 2. Maintenance department timekeeper makes out time ticket in duplicate for both general and special maintenance. One copy goes to the payroll department, the other to accounting. On special maintenance jobs accounting charges time against work order; on general maintenance, to department in which work is done. Figure 3. Requisition for maintenance material, signed by the maintenance foreman, goes to accounting department

work that will pass through each department. Maintenance expense will be related to the volume of this flow. Departmental production is the figure that management must use in deciding whether all or only a portion of the maintenance estimate submitted by the plant engineer shall be the maintenance budget for the next month.

Comparisons with past budgets, the expert estimate of the plant engineer, and management's financial viewpoint are then brought to bear on maintenance expense at the same time. From this concentration emerges the decision as to what the total expense may be for the succeeding month.

Under this plan there is no likelihood of management's being surprised when maintenance costs increase, for such an increase would have been considered and authorized before it was incurred.

It must not be supposed that the budget director is inarticulate during this monthly conference between the plant engineer and management. Far from it. Using estimates of production necessary to meet sales requirements, a budget for each department is prepared. In each of these budgets is a statement of general maintenance expense to be allowed.

How Allowances Are Figured

These allowances are on various bases. Cleaning, for example, is based on area, oiling and belting on units of production, and so on for the several items falling within the general maintenance group. The sum total of all these departmental allowances should equal the plant engineer's general maintenance estimate.

Certain standing orders (Figure 1) are now established to cover special maintenance. Numbers and titles of these orders remain fixed from period to period, only the totals to be spent on each order each month vary. At the beginning of each month the plant engineer asks the accounting department for work orders to cover work planned for that particular month. When these orders have been approved by the president and the works manager, they are sent to the accounting department. On this authority the accounting department issues several copies of a short work-order form, quite similar to the original but lacking some of the details. Copies are sent to the plant engineer, budget department, production foreman in whose department the work is to be done, and to each maintenance foreman who has a part to play in the completion of the special job. These copies constitute authority to do the job.

These work orders cover machinery,

(*Continued on page 106*)

DATE 9-6-38

MAINTENANCE WORK CARD

EMP. NO. 07-11

ORDER NO.

AUTHORIZED BY

NAME OF MCHE. OR EQUIPMENT WORKED ON

SHOP NO.

FOR DEPT 08

PURPOSE OF WORK Repair water line

CHARGED TO W.O. 16-9

START	FINISH	HRS.	DESCRIBE IN DETAIL	AMT.
7 00	3 30	8		7.52

MATERIAL

QTY.	DESCRIPTION OF MATERIAL	
		15.82
		23.34

TOTAL - - MATERIAL AND LABOR

USE BACK OF SHEET IF NECESSARY

SIGNED J. Bolstrum

Figure 4. Plant engineer keeps work cards on file to accumulate data on special work

Form 411-S

DETROIT LUBRICATOR COMPANY

Indirect Expense Budget

Dept. No. 21

Dept. Head Mr. Runquist — Date August 1938

Direct Labor $ 1,900.00 — Indirect Labor $ 203.00

a c	Description	Budget	%
1	Foreman		
2	Trucking	$ 20.	1.05%
23	Waiting for Work		
24	3A Washing Windows & Light		
	Total	$ 203.	10.68

Budget

Secretary and Treasurer

Figure 5. Copy of each department's monthly general budget goes to plant engineer

INDIRECT LABOR ANALYSIS

DEPT. NO. 21

DEPT. HEAD Mr. Runquist — DATE August 1938

DIRECT LABOR

						MONTH-BUDGET DIR. LAB.		MONTH-ACT. DIR. LAB.	
Week	511.03	484.56	524.52	513.87					
Accum		995.59	1520.11	2033.98					
Acct. No.	ACTUAL 1st WEEK	ACTUAL 2nd WEEK	ACTUAL 3rd WEEK	ACTUAL 4th WEEK	ACTUAL 5th WEEK	Budget $	BUDGET EXPENSE	Actual $	ACTUAL EXPENSE
1									
2	5.67	5.68	5.02	5.67				1.08	22.04
		11.35	16.37						
24									
Total	24.79	83.24	35.83	76.39		$		10.85	220.65
		108.03	143.86						

Figure 6. Accounting posts indirect labor analysis weekly from time tickets and material requisitions. A copy of this "spot carbon" form goes to each department head

How Six Plants Save by Limiting

Keeping the electrical demand down to the minimum feasible value is an effective way of reducing power bills that is used to advantage by many industrial plants.

Bills rendered by utility companies for electrical energy used are based essentially on two separate elements—demand charges and energy or current charges.

In the simplest terms, the demand charge represents fixed costs of doing business, such as investment charges and the like on the generating, transforming, distribution, and other equipment required to supply the customer's plant with any desired amount of current, 24 hours a day. Obviously, as the amount of current required, or the demand, goes up, there is a concomitant increase in the investment and other costs necessary to provide that service, and the charge for it increases.

Energy charges, on the other hand, are made up primarily of the cost of operating the utility plant.

When demand is measured by the use of suitable meters, common practice is to base it on the maximum consumption of energy in any 15- or 30-min. period during the month.

Methods used by six plants to limit their electrical demand follow.

1

POWER DEMAND PEAKS have been manually controlled at our plant since 1918. At that time it became apparent that some kind of control had to be exercised over the excessively high demand peaks. Therefore, we installed a telephone between the substation and the grinding departments so that the operator in the substation could order units to be taken out of service or put in as required to keep within the desired demand. This arrangement worked fairly well until 1926, when we changed the entire plant from 25- to 60-cycle current. At that time we installed 22 200-hp. Westinghouse clutch-type synchronous motors on our tube mills.

Then we installed eight single-pole snap switches on the panel carrying the power company's demand meter in the substation and connected these switches in series with the stop buttons of the clutch control circuits of eight of these motors. Since then the operator has controlled the demand through these large motors. Demands are predetermined from month to month, depending on the amount of material to be ground.

This method of control has been found to be very satisfactory, but it requires efficient operators. With an experienced operator it is possible, however, to attain a load factor of 98 per cent.

Demands have been reduced from 200 to 600 kw. per month, at a saving ranging from $150 to $450.—*E. G. Fluck, Chief Electrician, Lawrence Portland Cement Company, Inc.*

2

DEMAND IS MEASURED by a Westinghouse type RA recording demand meter with an adjustable contact which is closed by the demand meter pen when it reaches a predetermined value. Closing of the contact completes the coil circuit of a Westinghouse type MC relay, which in turn shuts off a white light, turns on a red one at the main switchboard, and energizes a light and a bell in the compressor house.

When the bell rings the attendant unloads the compressor and leaves it unloaded until the bell stops ringing, at the end of the 15-min. demand period, unless the air pressure falls too low to provide service in all parts of the plant. The value at which the demand meter rings the bell has been determined by experiment and is adjusted to suit the varying load levels of the plant. Usually it is adjusted so that the bell will ring not more than four or five times a day.

This control has been in operation for approximately five years.

It is difficult to determine either the reduction in demand or the saving in dollars, because of the method of adjusting the demand meter to suit fluctuating loads. This meter is not the one used by the power company, and since they are both run by clocks, close watching is required to keep the clocks synchronized and registering the same 15-min. periods simultaneously. The control could be arranged to unload the compressor automatically, but it is sometimes more important to plant operation to permit a high electrical demand rather than allow the air pressure to fall too low.—*L. Ylvisaker, Assistant to General Manager, Dravo Corporation.*

3

WE NOW CONTROL our demand by means of equipment furnished by the Moore Engineering Corporation, Newark, N. J., which is actuated by an electric eye. The function of this unit is to keep the peak loads within desired limits, thus insuring the maximum efficiency in utilization of power, and bringing about definite savings in our power bills.

The control unit is operated by means of the electric eye directly from the utility company's meters, by which the power bills are determined. This method of operation permits determination directly from these meters of the time and extent of control needed, without any actual electrical or mechanical connection with them.

Electric eye control permits a high degree of flexibility. The instrument that was built for us is a demonstration of this fact. When you can reduce the peak load of a plant by approximately one-half the actual draw of a controlled unit, such as an air compressor, without interfering with the productive activity of the plant, you are rapidly approaching an economy of operation heretofore unknown.

One type of instrument is shown in the illustration. The control cabinet is seen at the right. This unit has

Demand

three levels of control, adjustable to any kilowatt separation and setting desired. Adjustment to different load levels can be made in less than two minutes. The utility company's meter is at the left of the cabinet. The light source and the electric eye are shown at the left and at the right, respectively, of the meter.

Since installing this control in May, 1938, the average monthly demand has been reduced 40 kw. with a saving of approximately $36 a month in our power cost, which was the sole motive in installing it.—*A. J. Marshall, Chief Electrician, Traylor Engineering & Manufacturing Company.*

1

Lawrence Portland Cement Company, Inc.
Northampton, Pa.

2

Dravo Corporation
Pittsburgh

3

Traylor Engineering & Manufacturing Company
Allentown, Pa.

4

The Philip Carey Manufacturing Company
Cincinnati

5

Carondelet Foundry Company
St. Louis

6

Wagner Electric Corporation
St. Louis

4

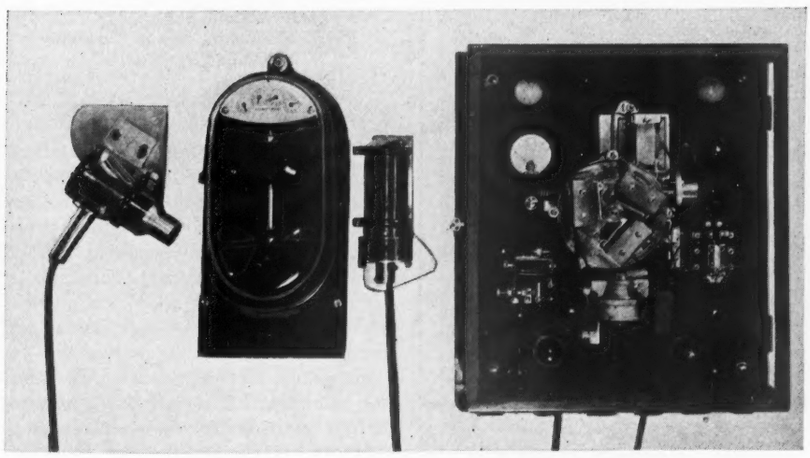
IN THE SUMMER OF 1937, increasing production raised the power requirements about 500 kw. above the capacity of our power plant. To meet this condition and provide for future expansion, a bank of transformers was installed, connecting our plant with the local utility.

A few months of operation showed excessive demand charges in relation to the amount of power consumed. This condition was due to the relatively small amount of power purchased, compared to our total load. Hence, a rather small percentage of load change would result in a demand larger than necessary. To meet this condition a General Electric GMS-10 demand meter was installed. It consists essentially of an actual demand mechanism, an ideal demand mechanism operated by a synchronous motor, and a timing mechanism, all in step with the utility demand meter.

The ideal demand mechanism is of course adjustable for whatever demand is desired. Each mechanism connects to a plainly visible hand on the face of the instrument so that the operator can determine at a glance the actual demand with respect to the ideal demand, and the amount of time still to elapse in the demand period. Should the actual demand overtake the ideal, a set of contacts is closed which in our case causes an alarm to sound.

It was originally planned to make this installation fully automatic and have these contacts trip the circuit by which we intended to regulate the load. However, a telephone circuit was installed between the power plant and the controlled load and it has been found to be highly useful, because the operator has such a complete picture of the demand period, both as to the registered and ideal demands and the time elapsed, that he can shift enough load to the generator to avoid exceeding the demand if the amount of power required is temporarily raised. If the power demand remains high, the operator uses the telephones to order a reduction in the load.

The cost of the installation was slightly over $300 and it has more than paid for itself each month that it has been in operation.—*John A. Faike, Chief Electrician, The Philip Carey Manufacturing Company.*



A photoelectric cell operates the demand-limiting device at the right. No connection is needed with the utility company's meter. For details see Item 3

5

OUR GENERAL FACTORY load is carried by a bank of transformers having a capacity of 350 kw. In addition to this load we have two electric melting furnaces supplied by 400-kw. and

(*Continued on page 105*)

Figure 1. Shows the general arrangement of wheel truing machines and power transmission equipment along one side

Flexibility with Group Drives

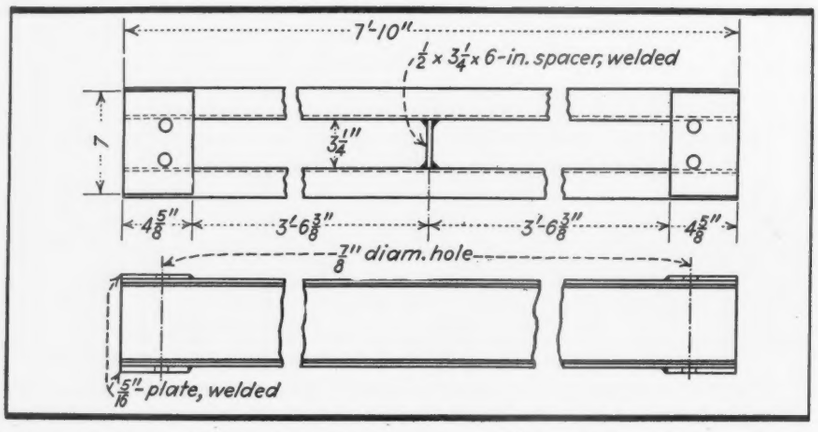


Figure 2. Stringers for mounting shafting hangers and other equipment were made of two channel irons placed back to back and separated by a spacer welded in place. Bearing plates were welded on the top and bottom at each end. Dimensions are merely typical, since several different sizes of stringers were required

CLARENCE W. DANIELS

Plants Engineer, Norton Company
Worcester, Mass.

THERE WERE MANY important questions that had to be decided when the recently completed addition to our factory was being planned. One of these questions concerned the choice of method for driving the machines. The decision to use group drive wherever possible was based on sound engineering and economic principles, as well as the results of previous experience. We knew, for example, that if each machine were driven individually the starting conditions would require the use of a considerably larger motor than would be needed to keep the machine going. The

resultant overmotoring would not only increase the total installed horsepower, with a correspondingly higher capital investment, but would result in a lower power factor. That condition, in turn, is undesirable and often expensive.

The new building, known as Plant 3, is of brick and reinforced concrete construction, one story high with basement. It has a monitor-type roof supported on heavy steel trusses. Length of the building is 315 feet, and width 125 feet. Figure 1 shows the general construction.

Houses Truing Machines

It was designed to accommodate the department in which abrasive wheels of all kinds are trued up and finished, the final stage in their manufacture. A large number of truing machines, many of which are of special design, are required to handle our output. These machines are located on the ground floor and are arranged for the most part in two long rows, with a wide aisle between them for trucking and foot traffic.

A number of the machines are driven individually because for one reason or another—location, amount of power required, or the design of the machine—it was advisable or necessary to adopt this method. By far the greater number, however, are driven from sixteen main lineshafts through 141 countershafts. Motors driving the lineshafts are the three-phase induction type and range from 2- to 40-hp. in rating. The total connected capacity is 300 hp. All motors are equipped with ball bearings. With one exception they are all rated 1,150 r.p.m., full-load speed. The one referred to is rated 30 hp., 860 revolutions per minute.

Three sizes of lineshafts are used—$1\frac{3}{8}$ in., $2\frac{7}{16}$ in., and $2\frac{15}{16}$ in. The total length of main lineshafting is 675 feet, the individual shafts ranging in length from 26 to 82 feet. Lineshaft speeds range from 240 to 418 r.p.m., depending on the operating speeds of the truing machines driven from each shaft.

In designing the mounting for motors, line-, and countershafts ease of changing the location as need might require was given prime consideration. Under our conditions the most suitable mounting consists of steel stringers suspended from the bottom of the roof trusses.

As will be seen from Figure 2, these steel stringers were made from two channel irons placed back to back. The two channels are separated the desired distance, which ranges from $\frac{7}{8}$ to $4\frac{7}{8}$ inches, depending on the size of motor or hanger, by means of spacers $\frac{1}{2}$ inch thick welded in place at about the middle. Steel plates $\frac{5}{16}$ inch thick, $4\frac{5}{8}$ inches wide, and of a length equal to the width of the flanges of the two channels plus the space between them, were welded on the top and bottom at both ends. These plates provide a bearing surface against the flanges of the I-beams on which the stringers rest. One or more $\frac{7}{8}$-inch holes for through-bolts were drilled in each plate.

For attaching the stringers to the I-beams we made use of special, cast-iron wedges and clips designed for this purpose. See Figure 3. When installing the stringers the wedge-shaped piece was first put on the lower flange of the I-beam and the stringer placed on top of it. The clip was then put in place and drawn up tightly against the underside of the I-beam flange and the stringer by the through-bolt.

It will be seen that with this arrangement the weight of the stringer

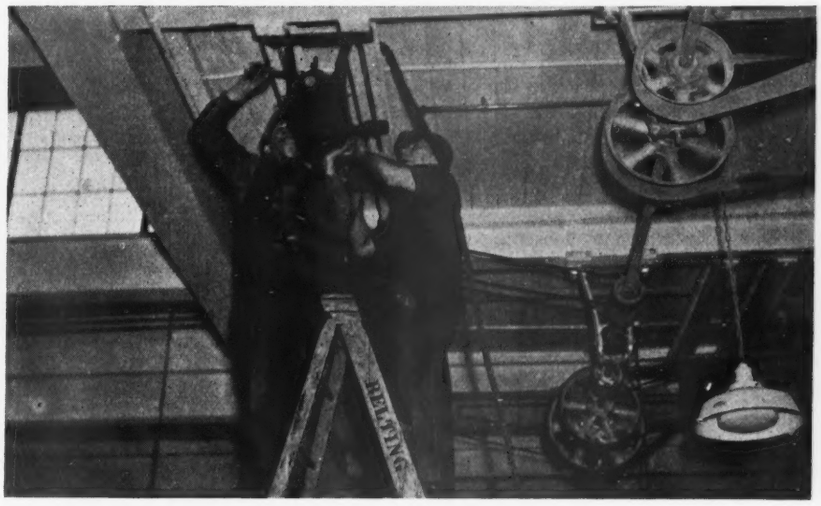


Figure 4. Both stringers and hangers can easily be shifted or relocated by loosening a few bolts. No drilling of holes is necessary

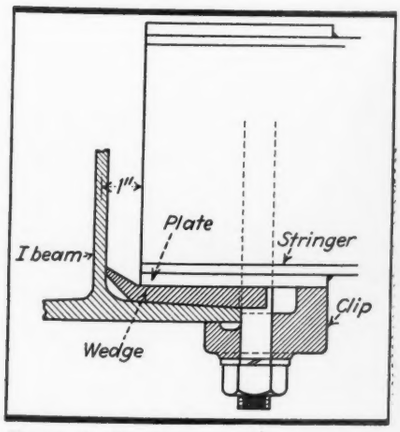


Figure 3. To give an even bearing, a wedge-shaped piece was placed under the stringers, which rest on the bottom flange of the I-beams

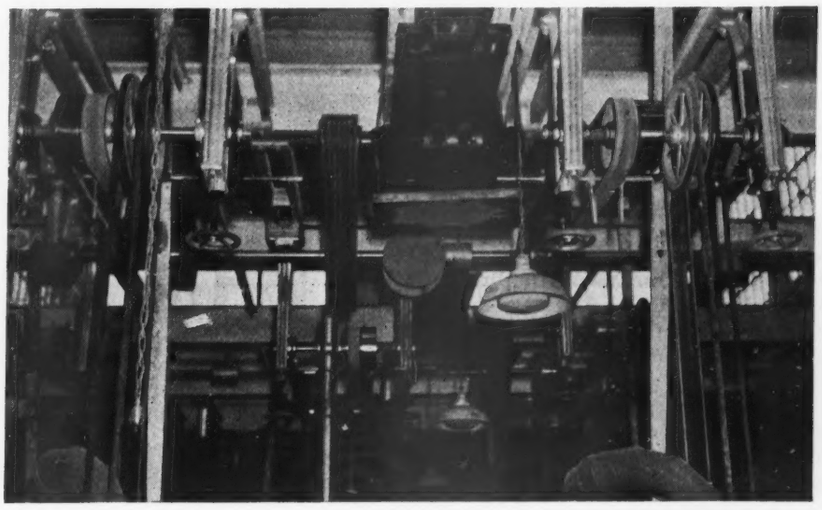


Figure 5. V-belts are used on all drives between motors and countershafts. Motors are mounted on slide rails, to facilitate installation and adjustment of tension

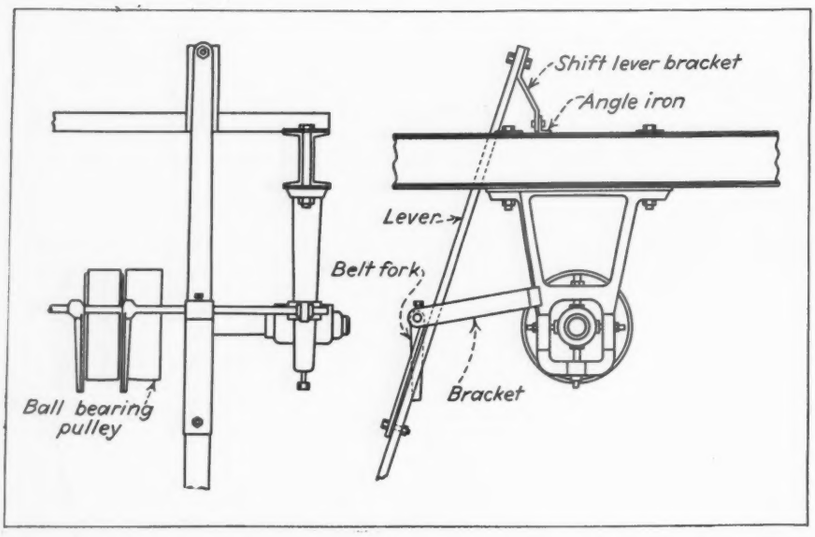


Figure 6. For more convenient operation, the belt shift levers were pivoted to a bracket mounted on an angle iron on top of the stringers

and the equipment mounted on it is carried by the flange of the I-beam, rather than by a bolt. At the same time the stringers are held in place so securely that there is little or no chance of their being loosened by vibration. Of course, a stringer can easily be shifted or removed by loosening the through-bolt.

Uniform spacing between I-beams was maintained throughout the building, so that stringers can readily be located wherever desired. Hence, changes in the layout of the machines or power transmission equipment can be made quickly and at small expense, without the need of drilling any holes.

Lineshaft hangers, Figure 4, are cast iron, of the four-point-suspension type, equipped with ball bearings. They are bolted directly to the stringers. Shifting to secure proper positioning or alignment is easily accomplished simply by loosening the holding bolts. Furthermore, the ease of moving the stringers and locating them at any desired point along the I-beams makes it possible to put hangers at the right place to give maximum support to the shafting, for example close to pulleys.

Countershafts are mounted on stringers in the same manner as described for lineshafts. They, too, are equipped with ball bearings. Several important advantages, such as small power losses, and low cost for lubrication and maintenance, are afforded by this type of bearing.

A certain amount of abrasive dust is given off in the process of truing grinding wheels. Despite every effort to remove it at the source by means of a highly efficient dust-removal system, a small amount escapes and floats in the air. Presence of this small amount of abrasive dust made it necessary to exercise great care in the selection and installation of the line- and countershaft bearings. They are all double-sealed against the entrance of dust.

Pulleys of the pressed-steel type are used throughout. All loose pulleys run on ball bearings.

Multiple V-belt drives are used between motors and main lineshafts, as Figure 5 shows. Standard grooved sheaves are used on the motor shafts, but on the lineshafts the V-belts run on flat pulleys ranging from 14 to 40 inches in diameter, with 4- to 10-in. faces. Since the motors are mounted on slide rails it is an easy matter to install belts and keep the proper tension on them. Altogether, these drives have been very satisfactory.

Between line- and countershafts two-ply, flat leather belts are used on center distances that range from about 8 to 12 feet. These belts are kept tight by sliding the countershafts back along the stringers or, when necessary, by cutting out a piece of the belt and resplicing it.

With the exception of one group, all drives from countershafts to truing machines are also flat leather belts, operating on about 10-ft. centers at an angle that approaches the vertical, as will be seen from Figure 6. Since the machines are started and stopped frequently belt shifters are used to throw the belts from the loose to the tight pulley and *vice versa.*

The height of the countershafts from the floor would have made it awkward to handle the ordinary type of shifter, because of the long throw required. This difficulty was overcome by pivoting the top of the shift lever in a bracket mounted on an angle iron placed above the stringers on which the countershaft is supported. See Figure 7. The shifter fork is mounted on a rod which slides through bearings in brackets clamped to the hangers. This construction makes it possible for the operator to shift the belts on the pulleys by moving the lever a conveniently short distance.

It was said before that with one group of machines flat belts are not used as the driving medium. These machines are of special design and because of the limited space available on them there is not enough room for a flat belt pulley. Therefore, each of these machines is driven through two long V-belts of special construction. The weight of certain parts of the machine is carried by the V-belts, which keeps them under proper tension. Countershafts for these drives can be raised or lowered, to facilitate installation of the belts or adjustment of length, by handwheels at the bottom of the hangers.

Maintenance of all power transmission equipment in the new plant is handled by one man, who divides his time between it and another building. Belts and other items are carefully inspected at frequent intervals, and adjusted or repaired as need arises. Use of ball bearings has made lubrication a very simple matter. Thanks to the ball bearings, it will be necessary to drain the old oil from each bearing and refill it only once a year.

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Five Ways to Get More Light

RAYMOND L. ANDERSON

Plant Maintenance Department
General Electric Company
Pittsfield, Mass.

THE FIVE WAYS

1. Make a 115/230-volt system by pulling in another wire and reconnecting transformer
2. Split system into two parts fed by separate transformers
3. Raise voltage and install a small transformer for each lamp
4. Raise voltage and install transformers to feed small groups of lamps
5. Split system into sections, each fed by a transformer at the load center

A FEW YEARS AGO 10 foot-candles of general illumination was considered excellent lighting for industrial plants. Present standards require 25 to 30 foot-candles, and this intensity is considered profitable and economical. In attempting to obtain such levels of illumination many plants find, however, that the capacity of their wiring is woefully inadequate. To secure these higher levels economically means providing wiring capacity for a consumption of about 6 watts per square foot.

Levels of illumination higher than 25 to 30 foot-candles are of course desirable and are provided for many industrial tasks. When light sources of higher efficiency are produced this additional efficiency will no doubt be utilized to increase illumination levels rather than decrease wattage consumption.

For the present let us assume that wiring capacity of 6 watts per square foot is needed for proper illumination and see what the old plant with inadequate wiring in the lighting system can do to meet that requirement.

Several schemes are available to the plant engineer for increasing the capacity of the existing lighting system without a complete rewiring job. For example, let us assume a conventional 115-volt, two-wire system of sufficient carrying capacity for about 10 foot-candles of illumination. If conduit capacity will permit a third wire to be pulled in the foot-candle output can be doubled, as shown in Figure 1. This arrangement of course means a 115/230-volt system. While such an expedient may help out a bad situation temporarily, it simply cannot provide the necessary watts per square foot for good illumination, except for tasks requiring 20 foot-candles or less.

Another method of accomplishing the same results by doubling the present copper capacity involves dividing the system at the center into two parts and feeding both sections from independent sources. This method is illustrated in Figure 2. Although this arrangement assumes the purchase of another transformer, the capacity of the existing

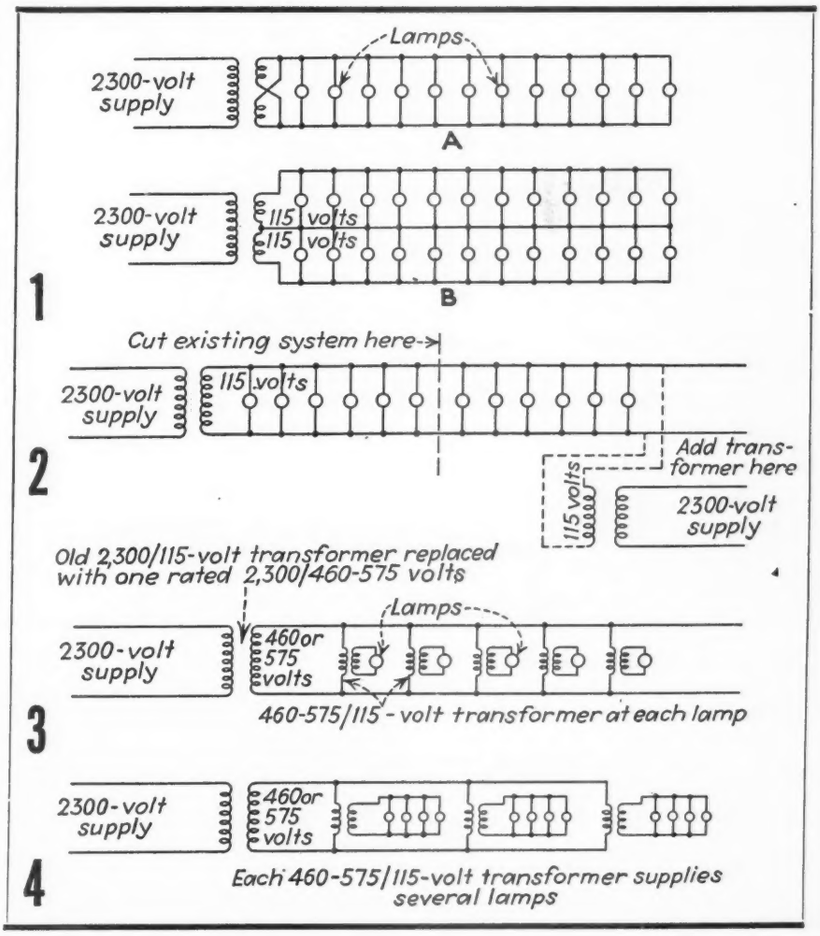


Figure 1. Capacity of an existing 115-volt, two-wire lighting system, *A*, can be doubled, *B*, by pulling in a third wire and reconnecting the transformer secondary for 115/230-volt, three wire distribution

Figure 2. Another way of doubling the capacity without adding secondary copper involves splitting the existing system into two parts and installing another transformer

Figure 3. Capacity can be increased four or five times by stepping up the secondary voltage to 460 or 575 volts and installing a small transformer to supply each lamp

Figure 4. A smaller number of transformers of higher rating will give the same results as the scheme shown in Figure 3, if each transformer is connected for several lamps

copper will be large enough to provide only double the illumination previously obtainable.

Two other schemes for increasing the copper capacity on this old 115-volt, two-wire system present themselves. If the insulation of the secondary circuits is in good condition, there is no reason why the voltage cannot safely be stepped up to 460 or 575 volts and used as the primary supply. The insulation on the wire originally installed would naturally be in the 600-volt class.

A small, air-cooled transformer rated 575/115 volts and of sufficient capacity to supply the largest lamp which it is

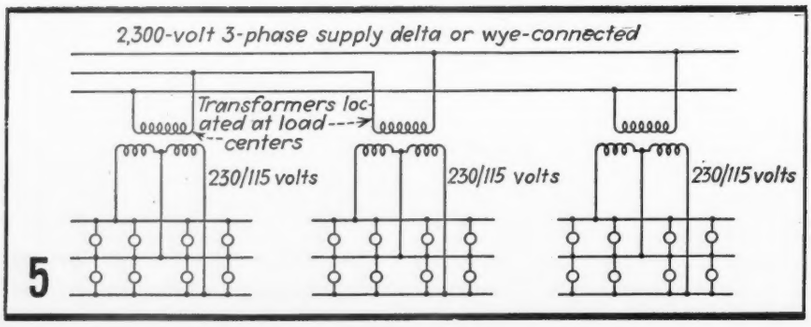


Figure 5. It was decided to locate a 100-kva. transformer at the important load centers. Under the prevailing conditions this arrangement resulted in a saving of about 40 per cent as compared with other methods of obtaining the same results

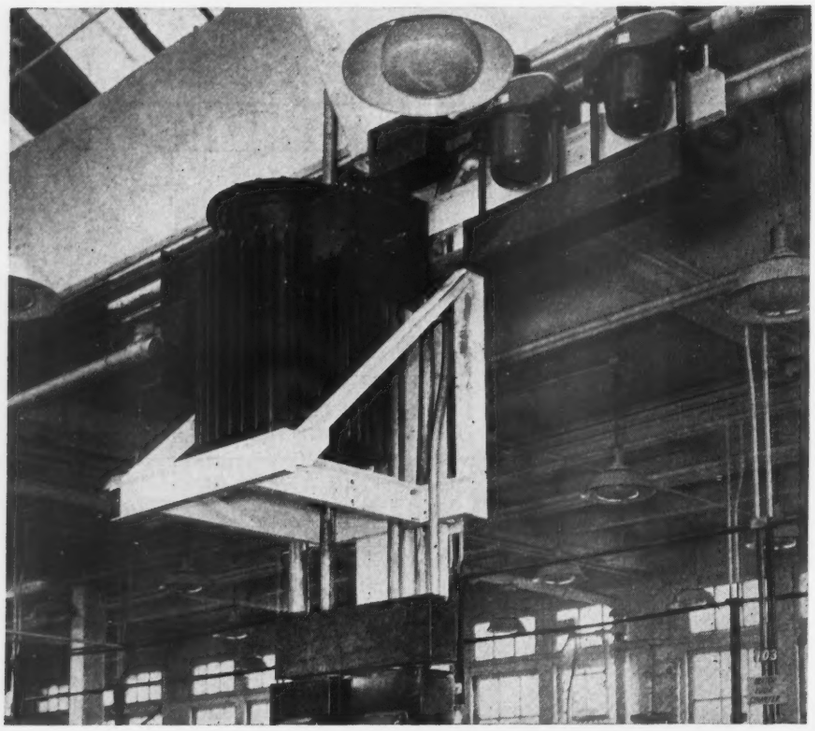


Figure 6. Transformers were mounted on structural steel platforms attached to the building columns. At the right can be seen the oil fuse cut-outs, one of which is placed in each line of the 2,300-volt, single phase primary supply

desired to use may be installed at each light outlet, as shown in Figure 3. This scheme will increase the power capacity five times, and although the cost of many such transformers might run high, the cost of a rewiring job to obtain the same increase in capacity might run much higher.

The other solution referred to involves installing one air-cooled transformer rated 575/115 volts and of 3- to 4-kva. capacity at each bay to supply several lights. This arrangement is shown in Figure 4. In this case some economies can be realized by installing the switches in the primary side of the transformer, thereby eliminating all the no-load loss.

In many old plants the wiring may of course be in such condition that nothing short of a complete rewiring job will be satisfactory. In any event, it must be kept in mind that in order to obtain an efficient lighting system a maximum drop of 2 volts between the source of supply and the most distant lamp is permissible. It is a well-recognized fact that light sources are very sensitive to voltage variations and therefore must be supplied constantly at rated voltage in order to operate efficiently.

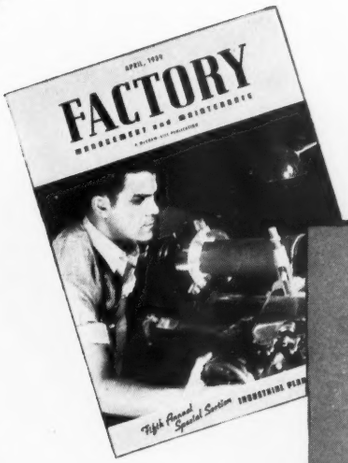
The importance of proper voltage at lamp sockets can best be appreciated from the fact that for every 1 per cent of voltage drop there is a 3 per cent sacrifice of illumination. Stated in other terms, a 10 per cent voltage drop on a 115-volt lamp will mean a 31 per cent loss of the illumination it can give at normal voltage.

When the problem arose of relighting

(Continued on page 103)

In the transformer coil winding department an average of 23 foot-candles is provided by 300-watt lamps in Glassteel fixtures spaced 8x8 feet, mounted 11 feet from floor

5TH ANNUAL SPECIAL SECTION



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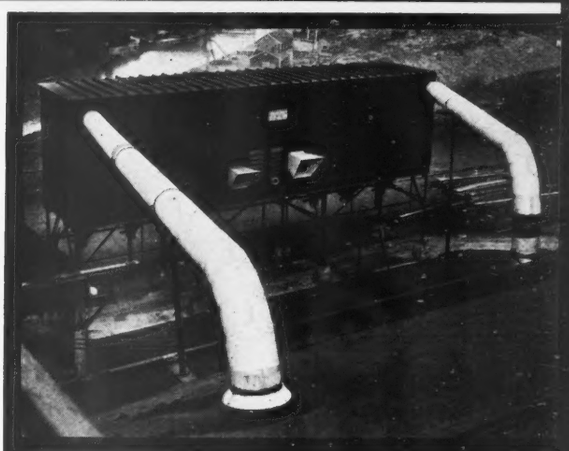

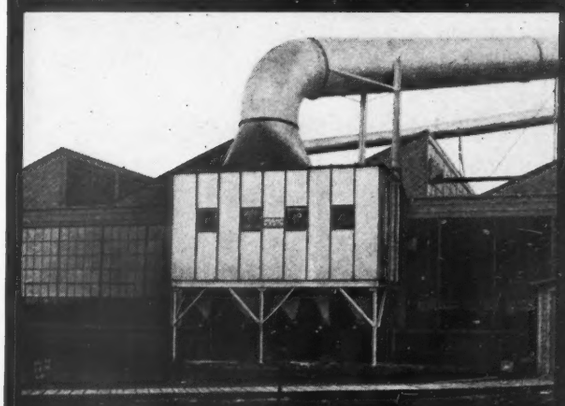

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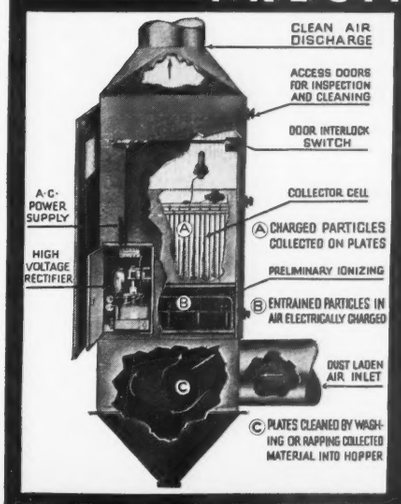
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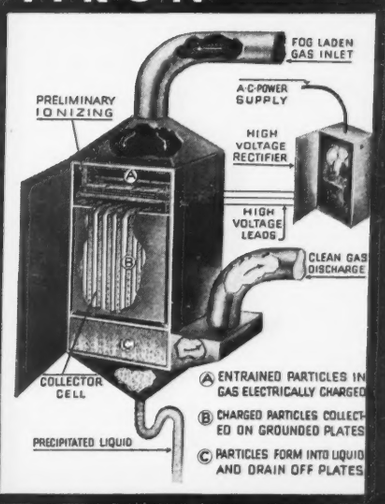
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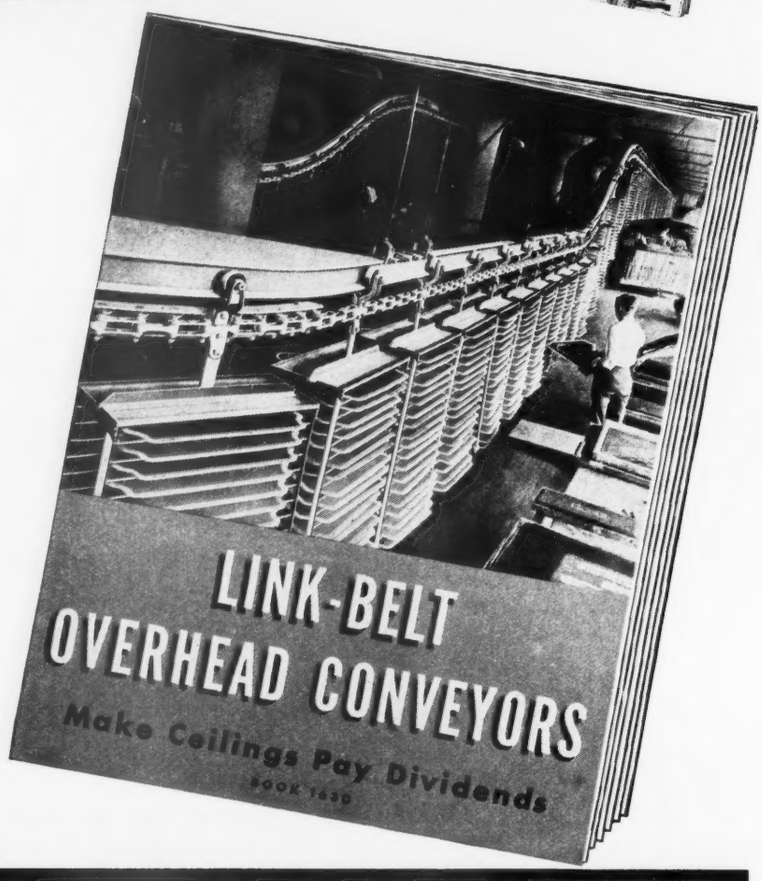

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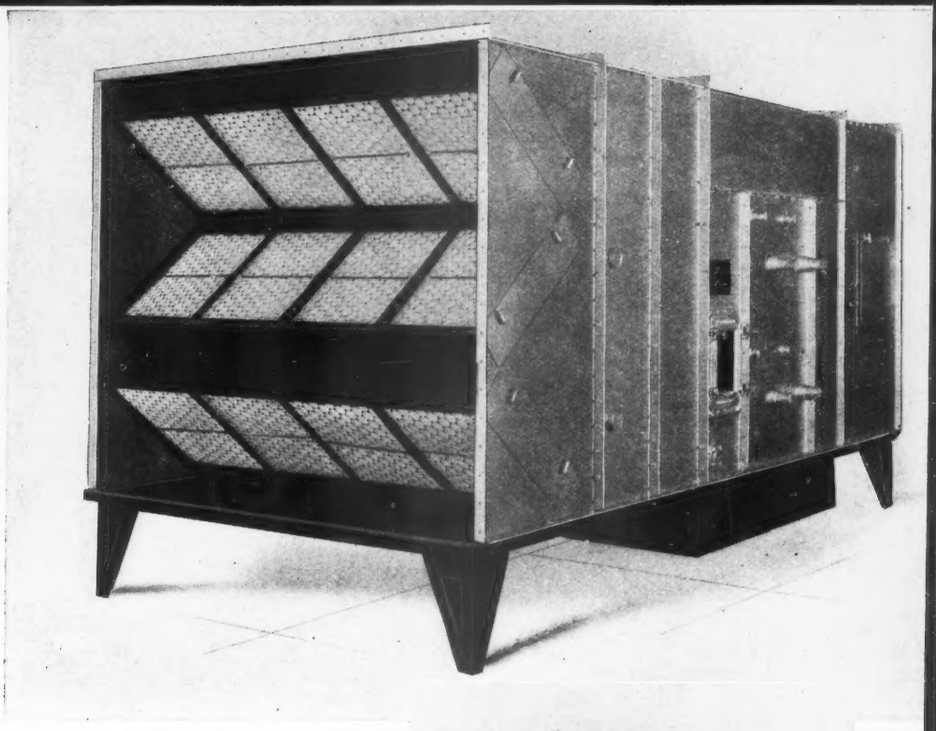

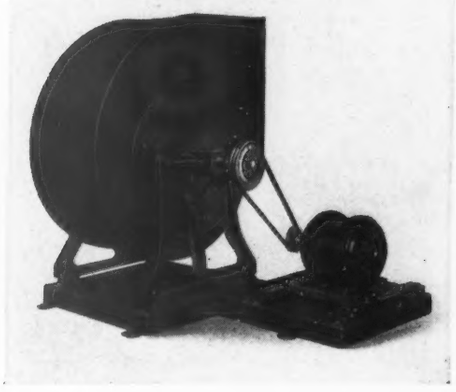

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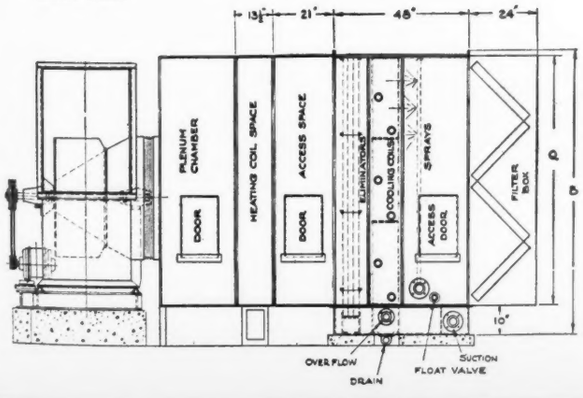

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Results: A 14-acre plant. Air conditioned. Windowless, save for offices, but well lighted through the use of 371,000 Owens-Illinois Insulux Glass Blocks installed in fifteen 600-foot monitors and in side wall panels.

As *Architectural Forum* says: "The finished plant is an excellent example of the effect of technological development on architectural design."

Insulux plays a big part in this miracle of mass production. Accurate readings show an extremely uniform light distribution throughout the entire plant, thanks to Insulux which transmits from 41 to 86.5 percent of available daylight, depending on the design selected. Yet, it has excellent insulating properties.

Insulux makes manufacturing processes more efficient. Where humidity runs high, it reduces condensation. Because it retards solar heat transmission, it helps air conditioning.

Nor does it overlook the human equation. By improving working conditions, it betters employee morale, health and efficiency.

Glass block can be installed in a building at a square foot cost comparable to commonly used wall materials. Where used, walls and windows are combined into a single unit, permitting definite savings.

Insulux is easy and economical to maintain. It requires no painting nor maintenance other than occasional cleaning.

There's an easy way to put Insulux under the microscope. *Install a test panel* in your own plant. Check it for cost and performance; then you'll always specify Insulux for new construction or modernization.

Practically every industry from textiles to autos has used Insulux. Any bricklayer will tell you that it's no trick to lay it up.

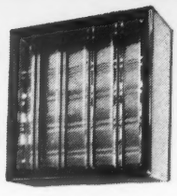
If you are interested in what Insulux did for Industrial Rayon, ask us for more proof. We'll send you additional details on this and other installations. Owens-Illinois Glass Company . . . Insulux Products Division . . . Toledo, Ohio.

ALL VIEWS:

The Industrial Rayon Corporation, Painesville, O. L. J. Jordan, Chief Engineer for Industrial Rayon Corp. Wilbur Watson & Associates, Cleveland, Architects and Engineers. The Hunkin Conkey Construction Company, Contractors.

OWENS · ILLINOIS

INSULUX



FIRST IN GLASS

GLASS BLOCK

Industrial Rayon cuts production time from weeks to minutes . . .

WESTINGHOUSE ELECTRICAL EQUIPMENT AIDS MANUFACTURING FEAT

New Developments Create New Economies

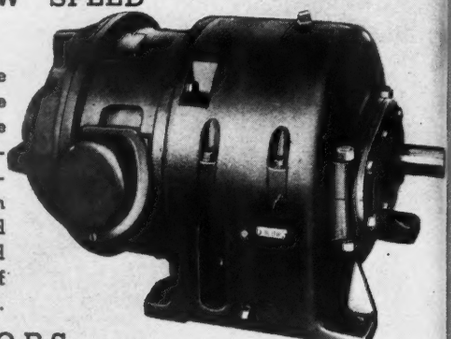
Westinghouse has pioneered in new developments that promote new economies . . . speed up production . . . save in overhead and power consumption. Manufacturers particularly will welcome the advice and counsel of Westinghouse electrical specialists in recommending new equipment or in modernizing existing electrical systems. For information about the newest Westinghouse developments, ask your nearest Westinghouse wholesaler, industrial agent, or district office. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

EASY TO START

The easy starting of Westinghouse synchronous motors has broadened their use. That is why more plants today are taking advantage of their constant speed, higher efficiency and power factor correction.

SYNCHRONOUS MOTORS

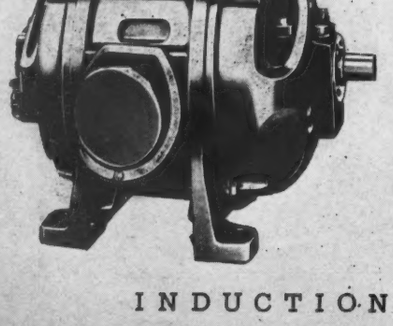
HIGH-SPEED MOTOR EFFICIENCY . . . FOR SLOW SPEED MACHINES



Gearmotors give the hp needed at the required rpm of the driven machine. Motor and speed reduction unit are built in one complete and properly matched unit. Saves cost of belts, chains, pulleys.

GEARMOTORS

EXTRA MOTOR STRENGTH . . . AT NO EXTRA COST



Extra electrical strength in Tuffernell insulation . . . Extra mechanical strength in rigid, one-piece frames. Ball or sleeve bearings free from lubrication troubles.

INDUCTION MOTORS

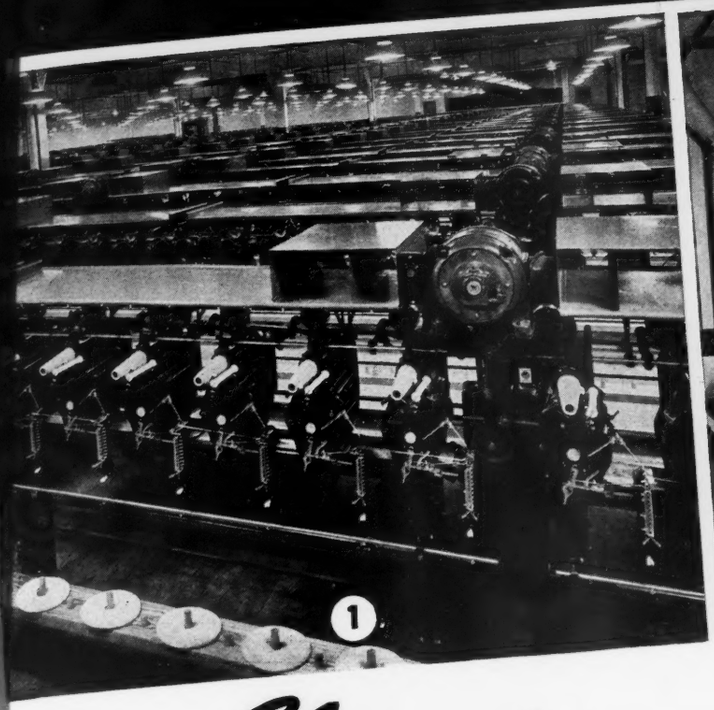
MOTOR STARTER AND CIRCUIT PROTECTION COMBINED

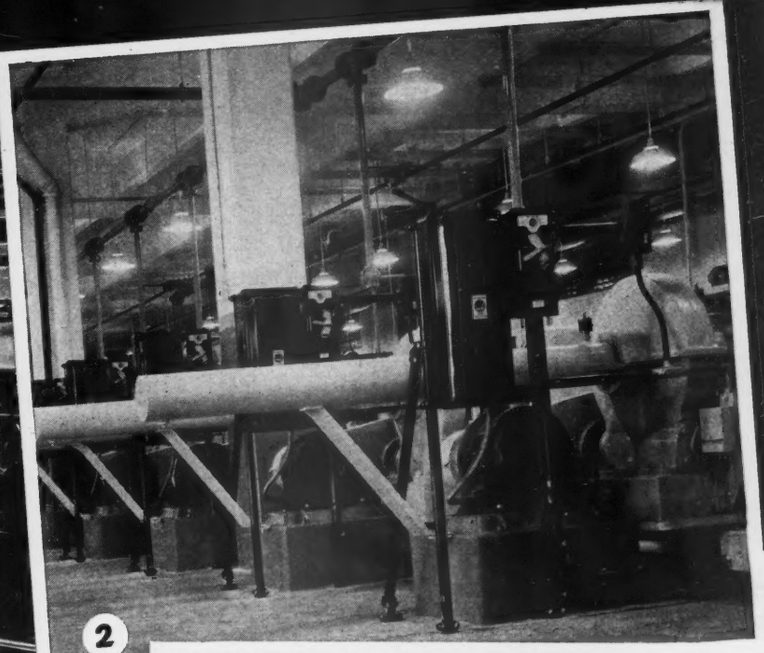
All necessary control and circuit protection wrapped up in a single package. Costs less to install . . . saves in space . . . saves wiring, conduit and labor . . . simplifies inspection . . . and gives complete protection.

COMBINATION LINESTARTER

Westinghouse

WESTINGHOUSE ELECTRIC





Newest

IN ELECTRICAL EQUIPMENT FOR THE NEWEST IN PLANTS

Definite evidence of Westinghouse engineering and equipment leadership appears on electrical apparatus throughout the new, windowless, air-conditioned Painesville, Ohio plant of the Industrial Rayon Corporation.

Here Westinghouse products are applied to many different jobs . . . motors and control, transformers, lighting, panelboards, switchgear, and power generating equipment. The specification of Westinghouse equipment for the world's most modern textile plant clearly indicates the ability of Westinghouse to serve every electrical phase of every industry. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

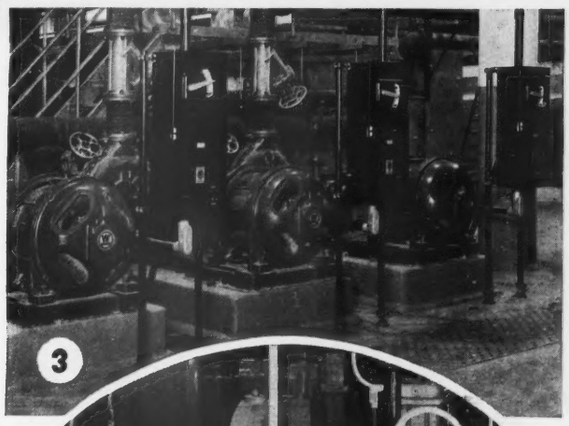
1 Two acres of winders — each individually driven by a Westinghouse motor, under a lighting system especially designed for this work.

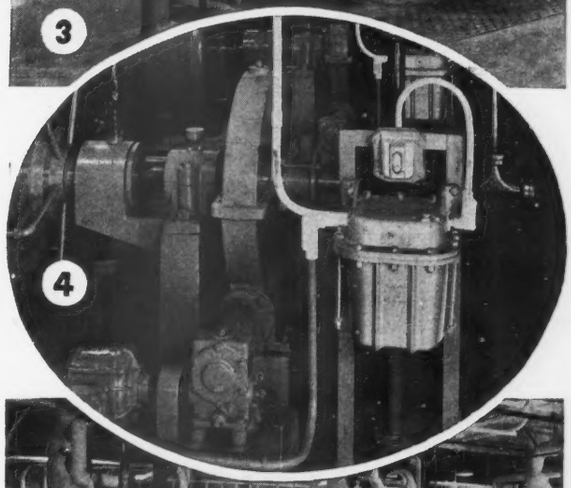
2 Complete protection and control in the Pulp Shredding room — a Westinghouse linestarter, Nofuze Circuit Breaker and push-button control for every grinder.

3 Westinghouse motors, each controlled by a combination linestarter, operate the condenser pumps in Industrial Rayon's powerhouse.

4 Complete Westinghouse drive on tumbling barrels, including motors, oil-immersed linestarters and push buttons — all explosion-proof.

5 In the refrigeration department, Westinghouse Synchronous motors are shown in the foreground. Rear are Nofuze Circuit Breakers and motor control for complete protection. J-90187





Motors and Control

The Mirror of GOOD MANAGEMENT

CLEAN SANITARY FLOORS

—the Low-Cost FINNELL WAY

Combining specialized skill in each phase of floor care, Finnell offers *a complete system of maintenance for every type floor,*—a unique service that facilitates efficient, low-cost upkeep of clean, sanitary floors.

Ask for **FREE FLOOR SURVEY**—*See What You'll Save!*

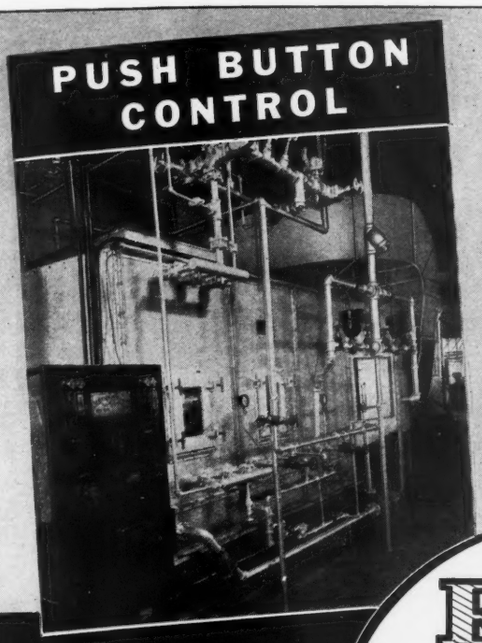
A Finnell floor survey will disclose method and equipment best suited to your individual needs and give you comparative figures showing present cost of floor care and actual cost of the recommended Finnell System.

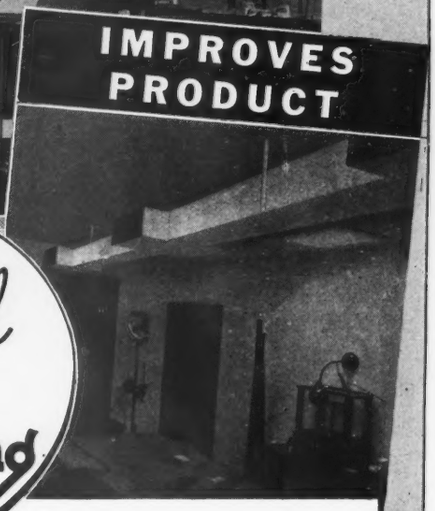
Phone nearest branch, or write Finnell System, Inc.
2504 East Street, Elkhart, Indiana

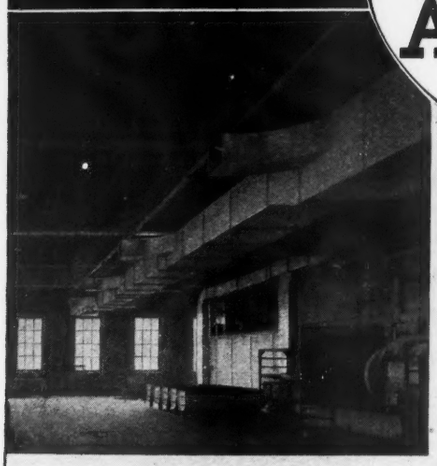
Distinguishing FEATURES OF FINNELL SERVICE

- **A Complete System of Maintenance for Every Type Floor.** Everything you need for low-cost floor care, — Equipment, Accessories, Supplies.
- **40 Sizes and Types of Equipment,** — a variety that meets the individual needs of all the industries served.
- **Nation-Wide Staff of Finnell Engineers** available for service, surveys, demonstrations, samples of floor supplies, etc.

FINNELL SYSTEM INC.
Pioneers **in FLOOR MAINTENANCE EQUIPMENT**







ROSS Industrial Air Conditioning

For Modernized Manufacturing

Today it is no longer a question of what air conditioning costs! Plant executives are more concerned about the extra cost of processing *without* the aid of proper air conditioning. The scientific control of plant atmospheric conditions has become a most important factor in achieving competitive standard of quality and production.

The Baking, Candy, Drug, Textile, Paper, Printing, Chemical, and many other industries furnish outstanding examples of advantages and economies secured with Ross Air Conditioning Systems designed for their individual requirements. With 25 years of industrial experience—"Ross Knows Air Conditioning."

Big New Descriptive BULLETIN

Just issued. Fundamental principles of design. Practical methods. Describes various types of industrial installations and treats subject of costs and trends. Write for your copy.

ROSS knows AIR CONDITIONING

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Efficiency that was born One Hundred Years ago

is built into Every

COLT

HEAVY DUTY SAFETY SWITCH

More than a hundred years ago appeared the first product on which was stamped the name COLT. From that day to this, every product bearing this now world-famous label has represented the highest quality.

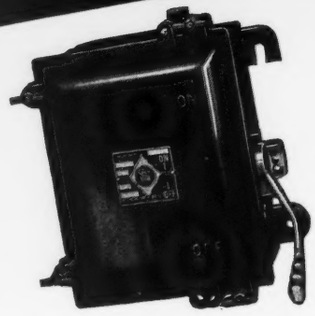
No. 75937
A big, husky 600 ampere Colt Quadbreak Safety Switch.

No. 75931
QUADBREAK SAFETY SWITCH
FOR 575 VOLT CIRCUITS

These switches utilize the famous Quadbreak mechanism . . . outstanding because of its efficiency, safety and long life. Available in sizes from 30 Amperes to 1200 Amperes.

No. 27231
DUALBREAK SAFETY SWITCH
FOR 230 VOLT CIRCUITS

Colt Dualbreak Switches are similar in design to the Quadbreak units . . are equally rugged and dependable. 30 to 1200 Ampere sizes.



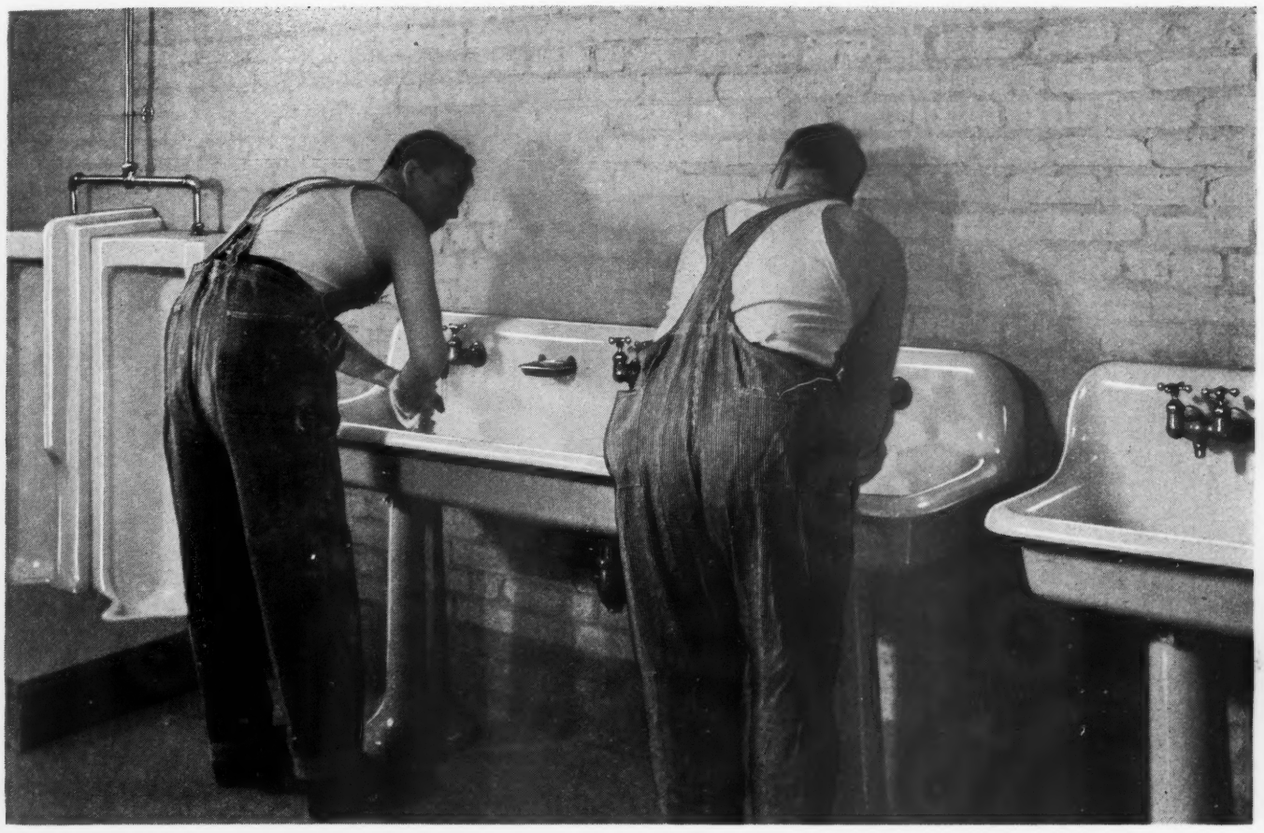
No. 99633
WITH WEATHERPROOF CABINET

These devices are enclosed in Heavy Cast Iron Cabinets . . resist moisture, dust and destructive fumes. Dualbreak mechanism assures long life and absolute safety.

New a complete condensed listing of all Colt Electrical Products in the new COLTALOG—
Your copy is ready — Send for it today.

COLT **ELECTRICAL PRODUCTS**

MANUFACTURED BY A WORLD FAMOUS ORGANIZATION
COLT'S PATENT FIRE ARMS MFG. CO., HARTFORD, CONN.
ELECTRICAL DIVISION

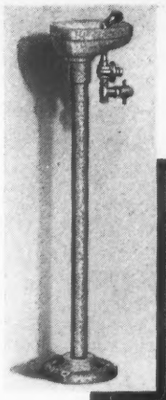


. . . It speaks to them more plainly than with words

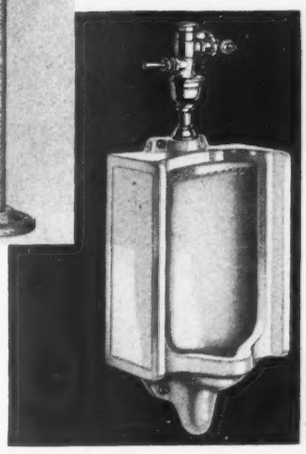
HERE is sanitary equipment that has an unspoken message for the employees who use it—a message which cannot be misunderstood. More plainly than with words it says, "Your Employer has given thought to your comfort and satisfaction. He has provided adequate sanitary equipment. And he has chosen CRANE-Equipment, because Crane industrial plumbing products contain more of the conveniences that assure you increased comfort and enjoyment."

The right sanitary equipment—properly placed—can do much to foster pleasant and profitable employee relations. And a new Crane brochure, "Plumbing for Industrial and Commercial Buildings" gives valuable guidance and help in providing better, more adequate sanitary facilities. It tells how CRANE-Equipment aids in preventing the dangerous back-siphonage which may prove such a menace to health. It shows how and why CRANE-Equipment is more durable, better built for the industrial job it must do. It explains why you should have the expert assistance of a qualified licensed master plumber.

Send today for your copy of "Plumbing for Industrial and Commercial Buildings"—find out why it pays to provide an improved standard of sanitary equipment in your plant or factory. Mail the coupon!



There's a satisfying and safe drink for employees in every plant equipped with Crane No. C-9332 THURSTENDS. One of many Crane fountains especially adaptable for heavy-duty service in factories.



The smart-looking No. C-15617 RIO urinal of vitreous china encourages cleanliness in employee washrooms— as well as permits easy cleaning of floors. Sturdy and efficient design makes it ideal for industrial installations.

CRANE

CRANE CO., GENERAL OFFICES: 836 SO. MICHIGAN AVE., CHICAGO

VALVES • FITTINGS • PIPE • PLUMBING • HEATING • PUMPS

CRANE CO. 4-39
836 South Michigan Ave., Chicago, Illinois F.M.&M.
Gentlemen: I want a copy of "Crane Plumbing for Industrial and Commercial Buildings"—without obligation, of course.

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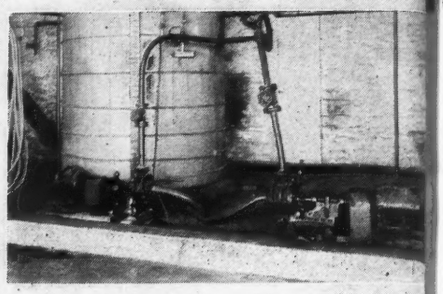
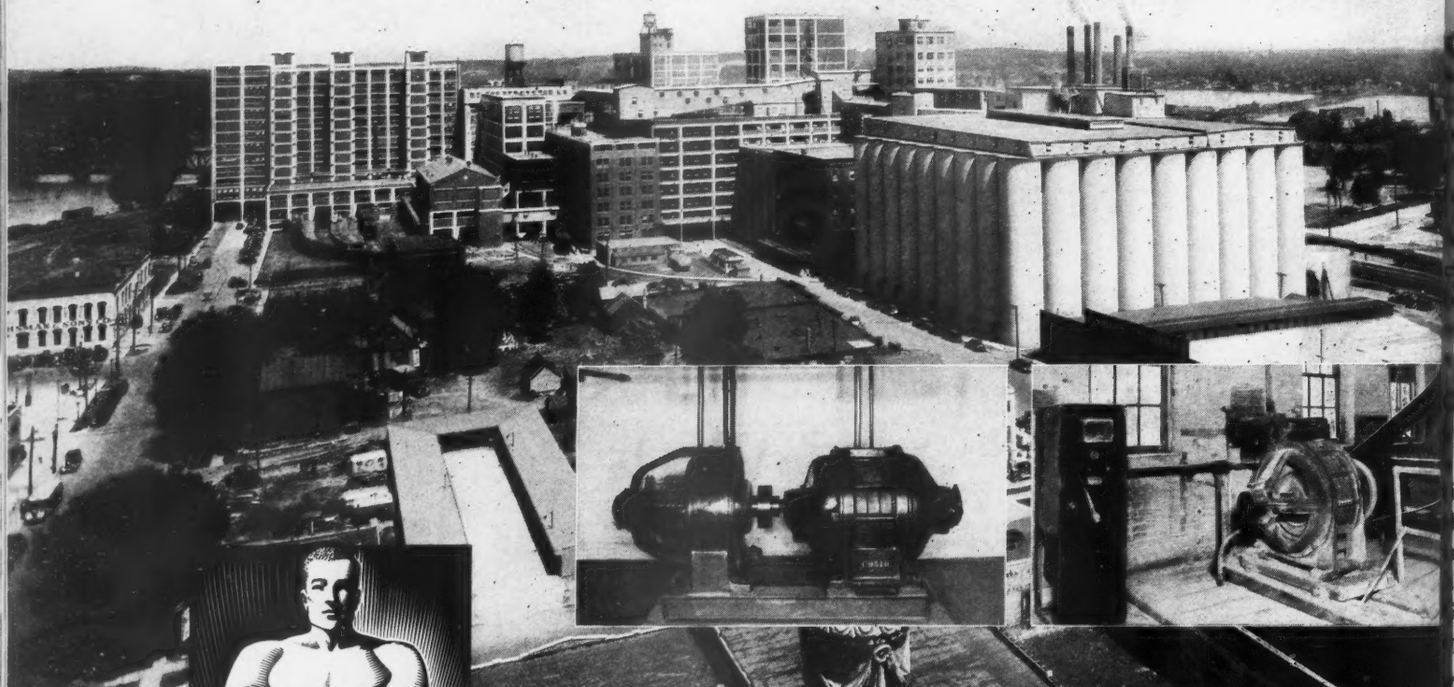
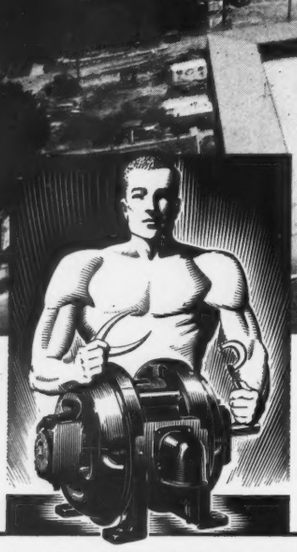
NATION-WIDE SERVICE THROUGH BRANCHES, WHOLESALERS, PLUMBING AND HEATING CONTRACTORS

ONLY 3½¢ per hp for

General view of Quaker Oats Co. plant at Cedar Rapids, and three typical G-E motor applications in the plant



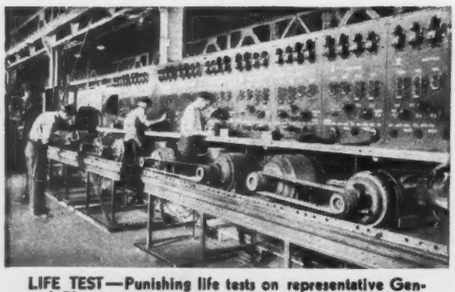




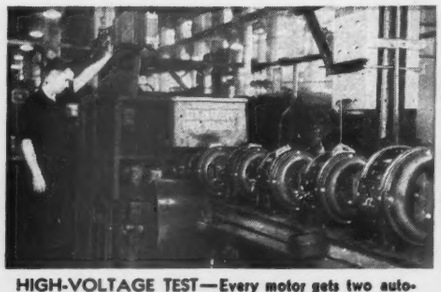
G-E MOTORS PASS ALL TESTS

ACCURACY TEST—Skilled workmen, using precision instruments, inspect the motor parts to make certain that they meet the exacting G-E specifications

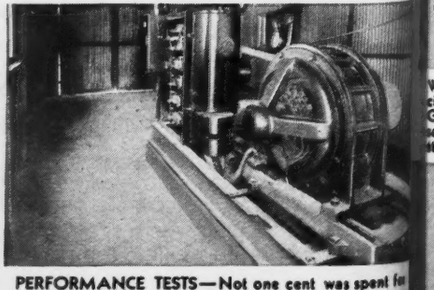
DYNAMOMETER TEST—Speed-torque characteristics of General Electric induction motors are determined accurately by dynamometers like this



LIFE TEST—Punishing life tests on representative General Electric motors assure correctness of design, long life, and low maintenance



HIGH-VOLTAGE TEST—Every motor gets two automatic high-voltage tests to make sure that the high dielectric strength of its insulation is maintained



PERFORMANCE TESTS—Not one cent was spent for repairs during this motor's 22 years of service. There are hundreds of records like this

Service Keeps 1540 G-E Motors Running for Quaker Oats Company

Another FIELD TEST of Motor Performance

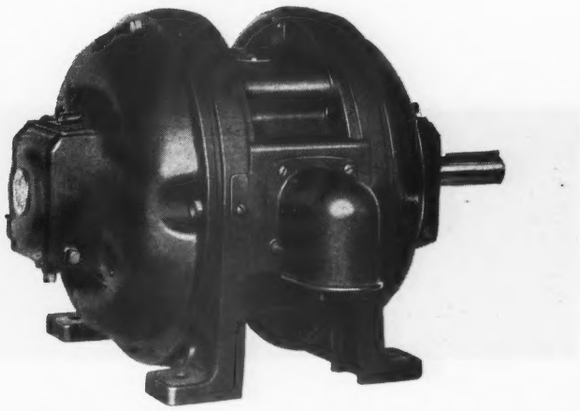
SINCE 1934 accurate maintenance-repair figures show that at the Quaker Oats Company plant at Cedar Rapids, Iowa, where 1540 G-E motors totalling more than 15,000 horsepower are installed, the average yearly cost for maintenance and repairs has totalled only $529—only 3½ cents per horsepower.

Materials and parts have cost only $253, and labor charges have been $276. This is a remarkable record because some of these 1540 G-E motors have been in service for as long as 25 years and are still operating satisfactorily.

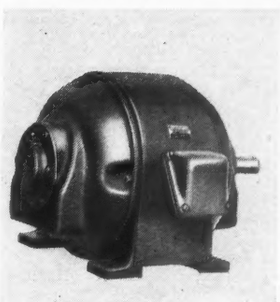
General Electric engineers and scientists have spent years in developing motor designs which have earned a reputation for dependability and economy of operation. Tests before motors are built and tests after they are built make sure that G-E quality is maintained, and also point out new ways to raise it still higher. They are your assurance that when you buy a G-E motor you get one that will give long life, low operating costs, and the motor performance you want.

For complete information on all types and sizes of motors, call the nearest General Electric Office or write General Electric, Schenectady, N. Y.

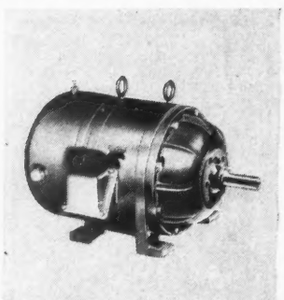
SEE THE G-E "HOUSE OF MAGIC" AT BOTH FAIRS



MORE FOR YOUR DOLLAR IN G-E MOTORS

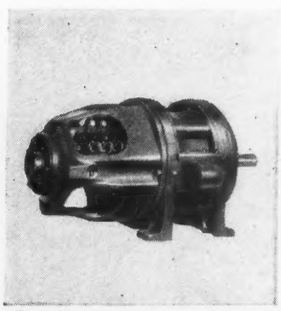


On jobs where there are splashing liquids or falling particles, this G-E splashproof motor will give you long motor life and low operating costs



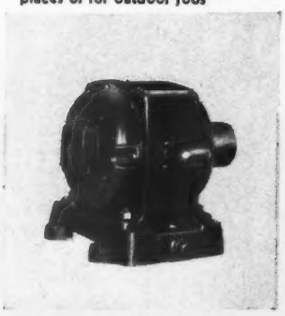
General Electric totally enclosed, fan-cooled motors will quickly pay for themselves in lower upkeep costs when used in dusty, dirty places or for outdoor jobs

Where you need a compact, efficient, low-speed power unit, use a G-E gear-motor—it will help you save valuable space and reduce installation costs



For adjustable-varying speeds, or severe starting-duty applications, a G-E wound-rotor induction motor will serve as a dependable, economical drive

Use G-E vertical motors on pumps, machine tools, agitators, etc. They will save valuable space and eliminate unnecessary gearing

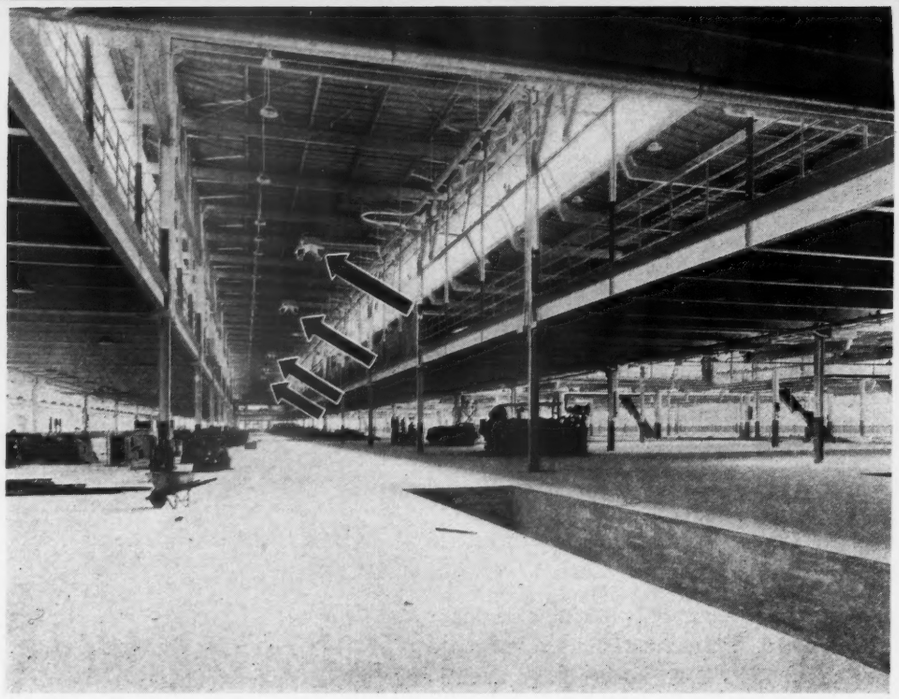


If your power is single-phase, use the simple, efficient, sturdy, constant-speed repulsion-induction motor. It has unusual accelerating torque and excellent power-factor

GENERAL ELECTRIC

020-368

Modern Automobile, Airplane and Industrial Plants of all types

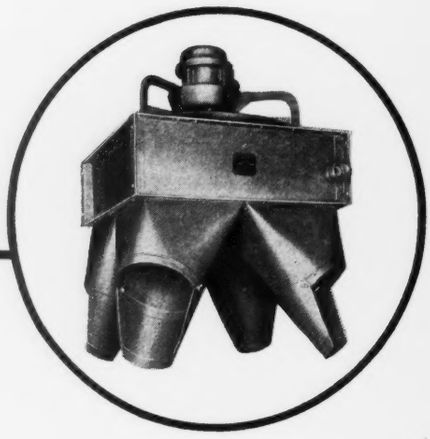


The Dodge Light Truck Plant, Detroit, Michigan in which over 90 Wing Heaters were installed.

Demand Today *that the working conditions throughout their plants* **BE IDEAL at all times —that the atmosphere throughout the working area, at the center of the building, next to the walls, close to doors, on the floor or up near the roof, must be uniformly heated with no hot or cold spots or perceptible drafts.**

The heaters that accomplish this seemingly impossible task in many of these plants are

Wing *Featherweight* UNIT HEATERS



which deliver live, invigorating, heated air down to the working area through specially designed multiple discharge outlets and produce a healthful warmth at floor level—without drafts and with resultant economies in plant heating.

Units can be obtained for installations ranging from 10 feet to over 50 feet in height, and with a choice of 8 different discharge outlets to suit the shape and size of your building.

Write for latest bulletin H-6AB fully describing these heaters and the new Revolving Discharge Outlets in detail.

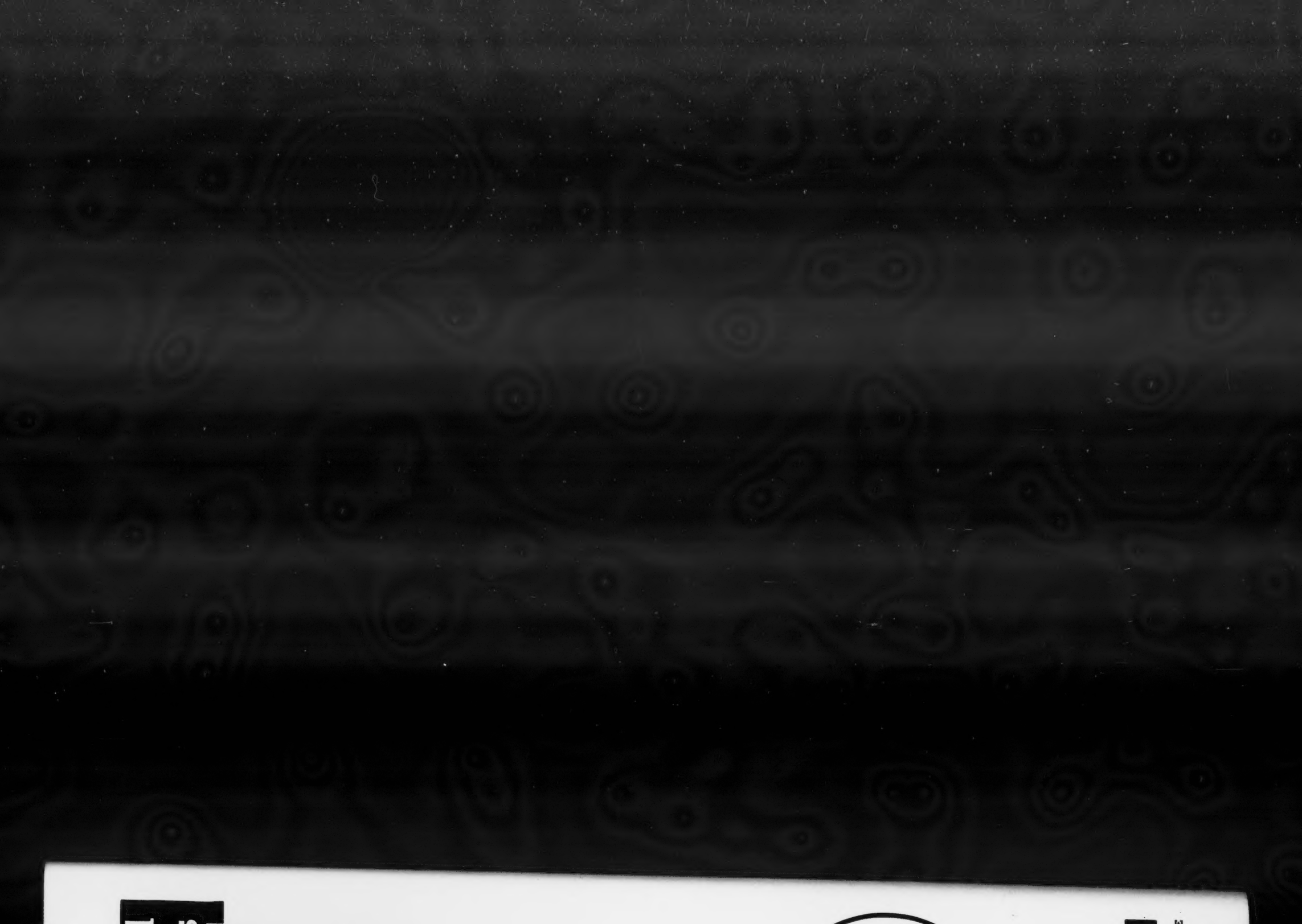
The most scientific method of creating air turbulence and heat distribution extending right down to the floor.

L. J. Wing Mfg. Co.

(The Pioneer of Ceiling-Suspended and Lightweight Unit Heaters)

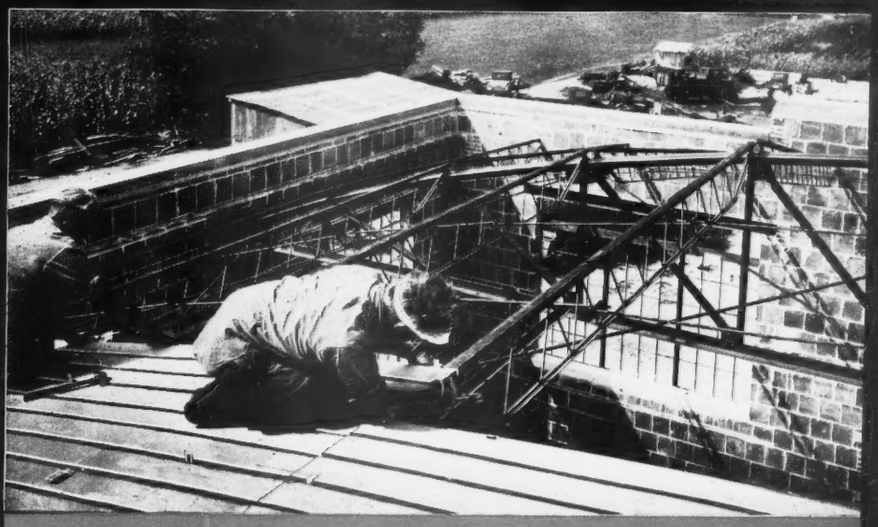
162 West 14th St. New York, N. Y.

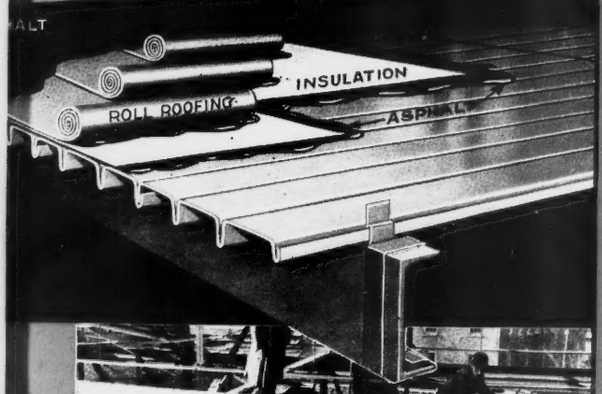
FLOODLIGHTS OF HEAT

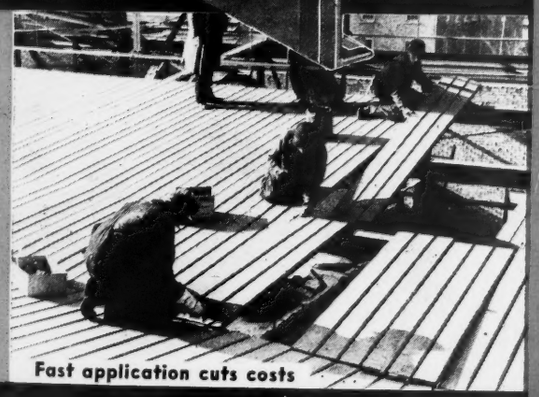


3 Reasons Why MILCOR Building Products help you run a profitable factory

1 You Build for Safety . . . Permanence . . . Long-Run Economy — with MILCOR Steel Roof Deck







Fast application cuts costs

Quickly ready for roll roofing

Unit of MILCOR SYSTEM of fireproof construction

Milcor here uses the word "system" in its true sense — not to signify a limited, inflexible set-up applicable only under certain conditions, but to represent so great a range of individual products, types, weights, metals, etc., that a complete, coordinated metal backbone can be designed to suit any condition of fireproof construction — all with Milcor products engineered to work together.

All the advantages of a *steel* deck—plus MILCOR'S special construction features

Here's a steel deck that meets your demands for fire-safety and low over-all costs, in a roof that stands for years as a tribute to your good judgment in specifying Milcor. It is steadily growing in popularity for large and small industrial buildings.

Jobs go through on fast schedules with Milcor Roof Deck. It is light in weight, easy to handle, and requires relatively light and less costly supporting structure. Quickly attached — with clips or welding — to any structural member. Unique off-set enables the erector to nest sections in record time, with the plates firmly interlocked.

Milcor Deck is adaptable to any type of construction and to real insulation, where required, with standard types of insulation board. Smooth deck permits insulation to be laid with ease . . . provides clean-cut appearance and longer life for roof covering.

Milcor Deck costs less than any other type of roof with equal insulating efficiency. Enjoy this low first cost . . . enjoy economy in erection and economy in maintenance — protect your buildings with Milcor Steel Roof Deck.

Our engineering staff is ready to work out suggestions and layouts to help you apply Milcor Roof Deck to any type of structure. Write today for free Milcor Roof Deck Bulletin, containing complete structural details.

Now turn to next page ➡ ➡ ➡

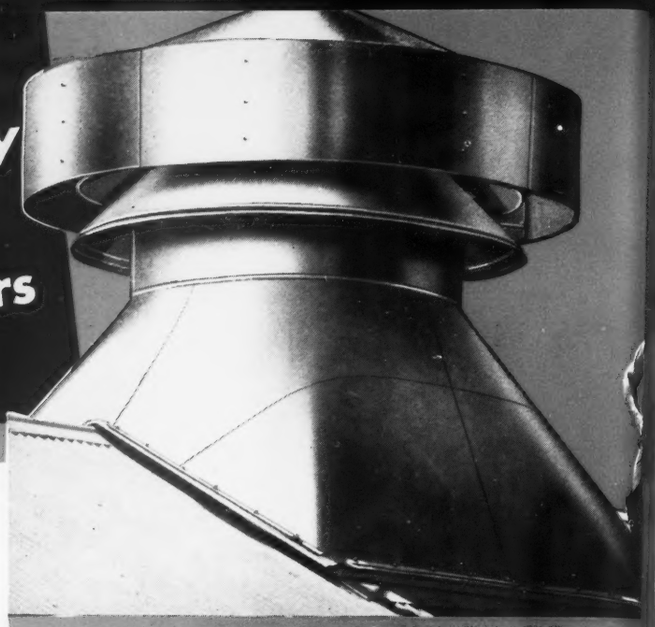
MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN — CANTON, OHI

CHICAGO, ILL. • KANSAS CITY MO. • LA CROSSE, WIS. • ATLANTA, G
• NEW YORK, N. Y. • ROCHESTER, N. Y.

Sales Offices: Minneapolis, Minn., Little Rock, Ark., Dallas, Tex., Denver, Col
Washington, D. C., Boston, Mass.

2 You step up your production efficiency at low cost with MILCOR Ventilators and Skylights



Milcor Ventilators and Skylights help you provide your buildings with adequate ventilation and light, so important to the quality and speedy, economical output of your product . . . to pleasant relations with your employees . . . There are many standard designs to meet your requirements on large or small jobs — also fabricating facilities for your special designs . . . *Milcor Ventilators* are ruggedly built, remarkably efficient. Their great exhaust capacity insures a constant change of air — makes costly power-driven systems unnecessary in many instances . . . *Milcor Skylights* are light in weight and withstand all weather conditions. They are easily and quickly erected. *Write today for information on Milcor Ventilators and Skylights.*

3 You Improve the Salability and Appearance of Your Finished Product with MILCOR Expanded Metal

- As open as woven wire
- Stronger than perforated metal
- Costs less than either

— and you *protect your workmen* by using as a machine guard material . . . *you save money* by preventing property loss, using it as a guard and partition material.

Provides adequate protection; permits light, ventilation, vision. Widely used for factory maintenance purposes; for display racks, air conditioning equipment, metal furniture, etc. Can be cut in any direction — strands cannot ravel or loosen. Readily formed in any desired shape with economy. 26 to 9 gauge stock, available in sheets up to 8 ft. square.

Let this interesting material itself suggest ways you can use it to advantage. Write today for free sample kit of Milcor Expanded Metal, containing samples of standard sizes, tables of weights, etc.

MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN • CANTON, OHIO

CHICAGO, ILL. • KANSAS CITY, MO. • LA CROSSE, WIS. • ATLANTA, GA. • NEW YORK, N. Y. • ROCHESTER, N. Y. • BALTIMORE, MD.

Sales Offices: Minneapolis, Minn., Little Rock, Ark., Dallas, Tex., Denver, Colo., Washington, D. C., Boston, Mass.

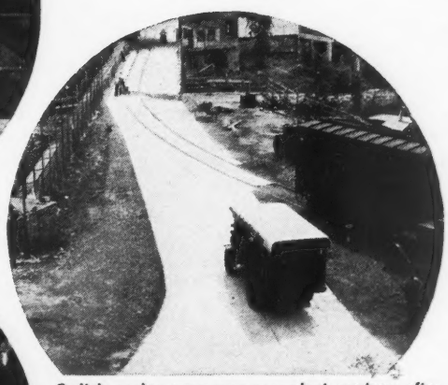
BUILD
make improvements and repairs

Save time and money

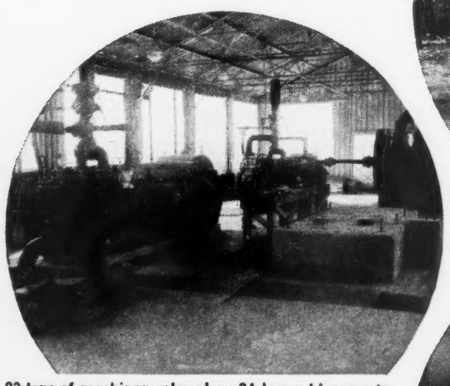
With

LEHIGH EARLY STRENGTH CEMENT

Electricity supplied 10 days earlier when modernizing power plant. Public Service Co. of N. H.

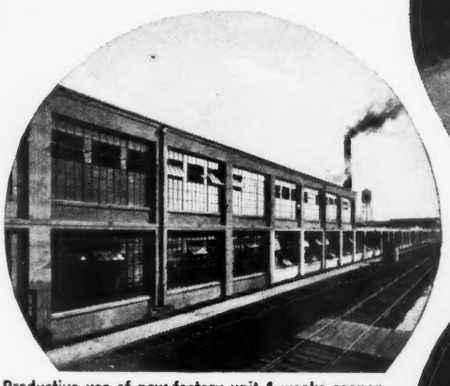


Switch engine runs over new plant roadway after 94 hours. Adam Scheidt Brewery, Norristown, Pa.



23 tons of machinery placed on 24-hour old concrete base. Pipe Line Division. Pure Oil Company.

No shipping tie-up when new loading platform was built. Tonawanda Boxboards, Inc., Tonawanda, N.Y.



Productive use of new factory unit 4 weeks sooner. Lane Company, Inc., Alta Vista, Va.

Uninterrupted production—concrete floor was placed on a holiday, used in 48 hrs. Spicer Mfg. Co., Pottstown, Pa.

THE illustrations suggest the advantages of quick service concrete in your building or maintenance program. Extra weeks of profit because of earlier use of new construction; no interruption to production for improvements and repairs. These are important things for industry to consider. Lehigh Early Strength Cement makes the finest quality dense concrete. When used under the same conditions, compared with normal Portland Cement, it cures to service strength 3 to 5 times faster. This means concrete that can be used in from 24 to 48 hours for most purposes. Keep Lehigh Early Strength Cement on hand for your maintenance crew. Consult your architect or engineer. Booklet showing profitable use by many industries will be sent on request.

LEHIGH PORTLAND CEMENT COMPANY
Allentown, Pa. Chicago, Ill.
Spokane, Wash.

Be Sure

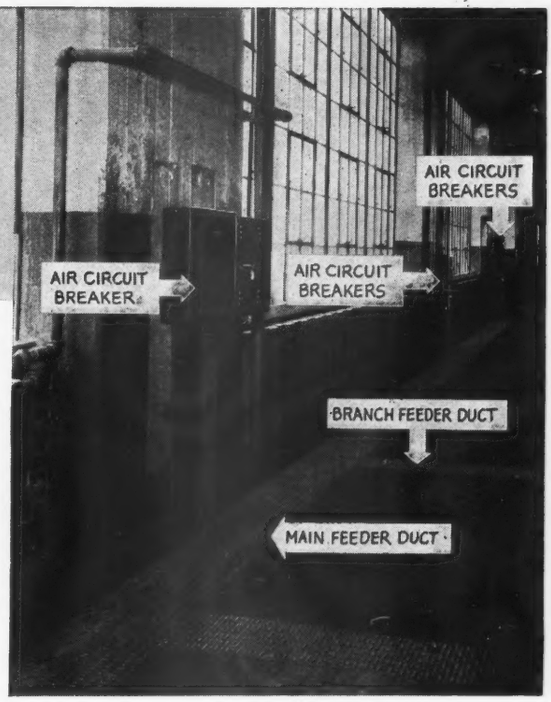
For Branch Feeders—the individual safety-enclosed breaker with plenty of "I C"

For Main Feeders—the shipped-assembled metal-enclosed switchboard with draw-out-type breakers →

G E N E R A L

"IC" of Your "IC"

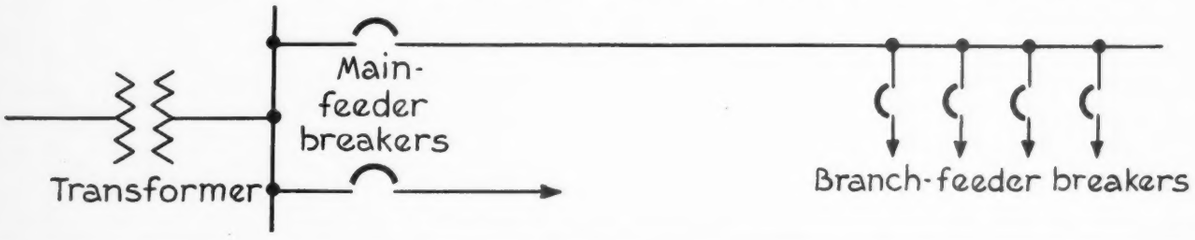
(Interrupting Capacity)



THE severity of a short circuit depends largely on the capacity of the transformers that feed the circuits, and it can *not* be determined by the normal load on the circuit. As plant loads have grown, transformer capacities have been materially increased. Therefore, short circuits present an ever-increasing hazard. They seriously endanger personnel and property wherever the power supply has outgrown the interrupting capacity ("I C") of the protective devices. Are you sure of your "I C"? With G-E air circuit breakers of *known* interrupting capacity, you *can* be sure.

If you have any question about how to determine the interrupting capacity needed, in order to know the size of circuit breaker to use, get in touch with the nearest G-E office.

How To Select G-E Air Circuit Breakers with Adequate Interrupting Capacity



Transformer Capacity in Three-phase Kva	Circuit Voltage					
	220-240 Volts		440-480 Volts		550-600 Volts	
	G-E Air Circuit Breakers to Use—Interrupting Ratings (Rms Amperes) and Type					
	Main Feeder	Branch Feeder *	Main Feeder	Branch Feeder *	Main Feeder	Branch Feeder *
300	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A
500	20,000—AE-1B	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A	10,000—AE-1A
750	40,000—AL-2	20,000—AE-1B	20,000—AE-1B	10,000—AE-1A	20,000—AE-1B	10,000—AE-1A
1000	40,000—AL-2	20,000—AE-1B	40,000—AL-2	20,000—AE-1B	20,000—AE-1B	10,000—AE-1A
1500	60,000—AL-2	40,000—AL-2	40,000—AL-2	20,000—AE-1B	40,000—AL-2	20,000—AE-1B
2000	60,000—AL-2	40,000—AL-2	40,000—AL-2	20,000—AE-1B	40,000—AL-2	20,000—AE-1B

* These breaker selections are based on the use of the listed main-feeder breakers, which are equipped with modern arc quenchers and the operation of which is properly co-ordinated.

All selections are based on average conditions, which include transformers of not less than 5 per cent impedance, and no connected synchronous machines of appreciable capacity.

ELECTRIC

890-77

"HEAT-CONDITION" YOUR PLANT *with* ROCKBESTOS *heat-resisting wires*

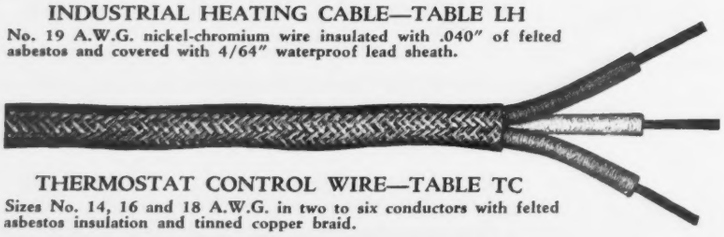
Here's real help for you in condensed form. Clip out and keep this page for quick reference when you reach the wire-specifying stage of your planning. If any of the wiring in your plant is exposed to heat, oil, grease, corrosive fumes or fire hazard—then you need Rockbestos. We show but a few of our wide line of asbestos insulated wires and cables. Samples and our new No. 10-E Catalog on request. Read the descriptions and learn how our wires may help you.
Rockbestos Products Corporation, 917 Nicoll St., New Haven, Conn.

INDUSTRIAL HEATING CABLE—TABLE LH

No. 19 A.W.G. nickel-chromium wire insulated with .040" of felted asbestos and covered with 4/64" waterproof lead sheath.

This pliable cable distributes a mild heat evenly over large areas. Prevents freezing of water pipes, wet pipe sprinkler systems, etc. Keeps conveyor pipes for soap, varnish, ink, chocolate, etc., at temperatures that insure even flow. Send for folder.

★



THERMOSTAT CONTROL WIRE—TABLE TC

Sizes No. 14, 16 and 18 A.W.G. in two to six conductors with felted asbestos insulation and tinned copper braid.

A multi-conductor control wire for low voltage intercommunicating, signal and temperature control systems. Its lifetime insulation and metal braid armor will give you troubleproof circuits.

★

600 VOLT A.V.C. BOILER ROOM WIRE—TABLE C

Sizes No. 18 to No. 0000 A.W.G. This construction for sizes 18 to 8, sizes 6 to 0000 have another felted wall next to the conductor.

For lighting and control circuits exposed to heat and moisture, oil, grease, fumes or fire hazard, such as exist around furnaces, ovens, lehrs, soaking pits, boilers, etc., this widely-used A.V.C. construction is ideal. Also for locomotive panel wiring and for switchboards on which an asbestos braided wire is required.

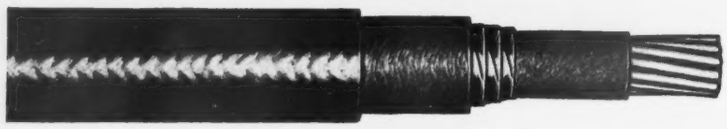
★

600 VOLT ALL-ASBESTOS RHEOSTAT CABLE—TABLE R

Sizes No. 18 A.W.G. to 2,500,000 CM insulated with a heavy wall of felted asbestos and a rugged asbestos braid. Finished in black, white or colors.

Use this power and rheostat cable or Table A, All-Asbestos Rheostat Wire for wiring rheostats, switchboards, elevator and locomotive control panels and electrical equipment exposed to heat, fumes or fire hazard. Also for general open wiring in hot locations.

★

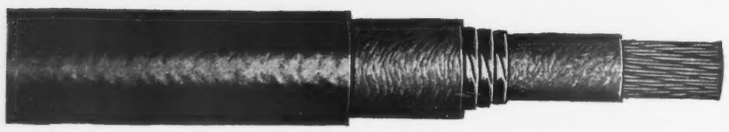


600 VOLT A.V.C. POWER CABLE—TABLE E

Sizes No. 18 A.W.G. to 2,500,000 CM insulated with laminated felted asbestos and varnished cambric, and asbestos braid. Other constructions for service voltages up to 8000.

This cable is recommended for power circuits and hot-spot wiring in or around boiler rooms, ash pits, steam tunnels, soaking pits, tenter frames, glass plants, steel mills, etc. The asbestos and heat-sealed varnished cambric construction has ample moisture resistance and withstands high temperatures indefinitely without failure.

★

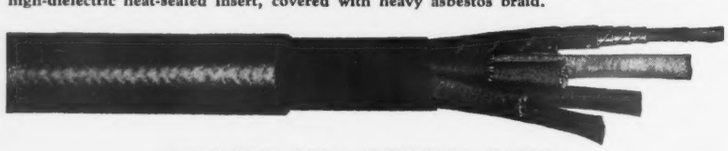


600 VOLT A.V.C. MOTOR LEAD AND APPARATUS CABLE—TABLE L

Sizes No. 18 A.W.G. to 1,000,000 CM insulated with two walls of felted asbestos and a high-dielectric heat-sealed insert, covered with heavy asbestos braid.

Heatproof, fireproof, greaseproof and oilproof, this cable will not dry out and crack, won't burn or carry flame, and will remain permanently flexible. For coil connections, motor and transformer leads where extreme heat and fire hazards are encountered as in steel mills, boiler rooms, etc.

★



600 VOLT A.V.C. CONTROL CABLE

In one to 19 conductors. Standard stranding A.W.G. No. 12—19/25 and No. 9—19/22. Other strandings furnished to order.

Designed for use under conditions too severe for control cables with other types of insulation which deteriorate rapidly when exposed to high temperatures. Operates without failure under the attack of heat, oil, grease or corrosive fumes and is suitable for installation either open or in conduit as it has ample moisture resistance.

★

Also refer to Electrical World Buyer's Reference

WRITE FOR THE NEW ROCKBESTOS NO. 10-E HANDBOOK-CATALOG

ROCKBESTOS—*the wire with permanent insulation*

Cash in on SAFETY with Modern Floors

Photo shows "A.W." Super-Diamond Pattern

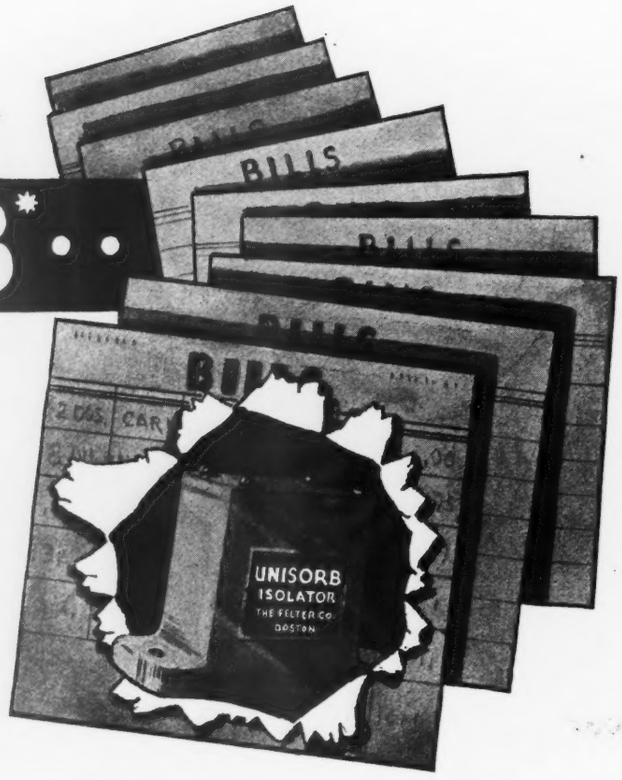
There is one great intangible in figuring the cost of industrial floors—the constant danger of slipping and falling accidents. The practical economy of "A. W." Rolled Steel Floor Plate lies in its ability to make floors *permanently* non-skid. Every step is a safe step. Wheels roll safely and swiftly. "A. W." Floor Plate is easy to clean and quick to drain. Oil-proof, heat-proof, crack-proof. Can be cut to any shape and installed without disturbing production. No maintenance expense because toughest traffic will not damage or impair it. If you want to investigate the practical economy of "A. W." Rolled Steel Floor Plate, write for literature showing five patterns and giving complete engineering data.

"A. W." *Rolled Steel* FLOOR PLATE

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Detroit, Los Angeles, Seattle, San Francisco, Houston, Roanoke, Buffalo, Pittsburgh, Cleveland, Chicago, Cincinnati, New Orleans, St. Paul, St. Louis, Montreal. PRODUCTS INCLUDE—"A. W." Rolled Steel Floor Plate : : "Swede" Pig Iron : : Billets—Blooms and Slabs : : Sheared Steel Plates : : Hot Rolled Sheets and Strip : : Steel Products also furnished in Copper and Alloy analyses.

UNISORB*..



Cuts Costs!

IT is a known fact that uncontrolled vibration transmission from machinery causes unnecessary repairs to machines and buildings.

Felter's Certified Unisorb has proven through actual tests on a wide variety of machinery to be an effective solution for vibration transmission.

Felter's Certified Unisorb is installed easily—no ripped-up floors —no bolting down—no long delay. It has long life and is not affected by lubricants.

Send for our free illustrated book on vibration. It tells of some of the many installations made by Felter's engineers. Write for your copy today!

The unit pictured above is one type of Unisorb isolator. There are other types—each type being scientifically adapted to a certain type of machine.

THE FELTERS COMPANY, INC., Dept. AB, 210 SOUTH ST., BOSTON, MASSACHUSETTS

Offices at New York, Chicago, Philadelphia, Detroit, St. Louis, Dallas, San Francisco • Mills at Johnson City, N. Y., Millbury, Mass., Jackson, Mich.

* Reg. U. S. Pat. Office

Fuel Savings quickly "Write Off" the cost of GRINNELL THERMOLIERS

When you select your unit heaters from the three types and thirty sizes of Grinnell Thermoliers, you're insured real heating satisfaction and substantial fuel savings. These compact, powerful Unit Heaters push comfortable warmth out where you want it, *when* you want it — with an efficiency that only Thermolier's 14 Points of Superiority can give.

The exclusive Internal Cooling Leg continuously drains condensate from the system — ends the inefficiency of impeded circulation. A copy of the Thermolier Catalog describing fully the 14 Points of Superiority is yours for the asking. Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Branch Offices in Principal Cities of the United States and Canada.

Build THERMOLIER SAVINGS LIKE THESE *into your plant . . . .*

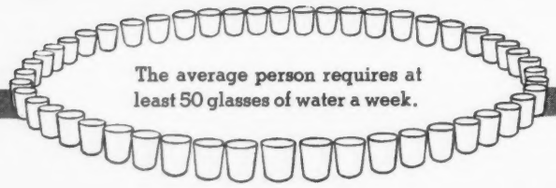
"Reduced fuel consumption 75 tons — a clear saving of 35%."

"Saved 29% in steam consumption since modernizing with Grinnell Thermoliers. . . ."

"We have equipped . . . all of our newer plants with Thermoliers and found that savings averaging 30% justified modernization even in most older plants."

GRINNELL THERMOLIER

THE UNIT HEATER WITH 14 POINTS OF SUPERIORITY



NON·CLOG DRAINS

CUT SERVICE COSTS

Here is one of the greatest money-saving improvements ever built in a water cooler. The Westinghouse large, ¾ inch, "straightaway" drain pipe obsoletes all old-fashioned, coil drained coolers. It banishes forever the common and costly operation of continually cleaning out drains clogged with lint, waste, food particles, tobacco and other foreign matter. Non-clog drains slash service costs.

Other Exclusive Features That Give EXTRA Value

Stainless Steel Top . . . Special Capacity Booster . . . High Efficiency Cooling Chamber . . . Built-in Watchman Protection . . . Permanent Oil Supply . . . Burnout-Proof Motors . . . Hermetically-sealed Mechanism. No grit, dirt, rust or corrosion . . . the things that cause most machinery to wear out, can harm the Westinghouse mechanism because it is Hermetically-sealed inside an airtight case of solid steel.

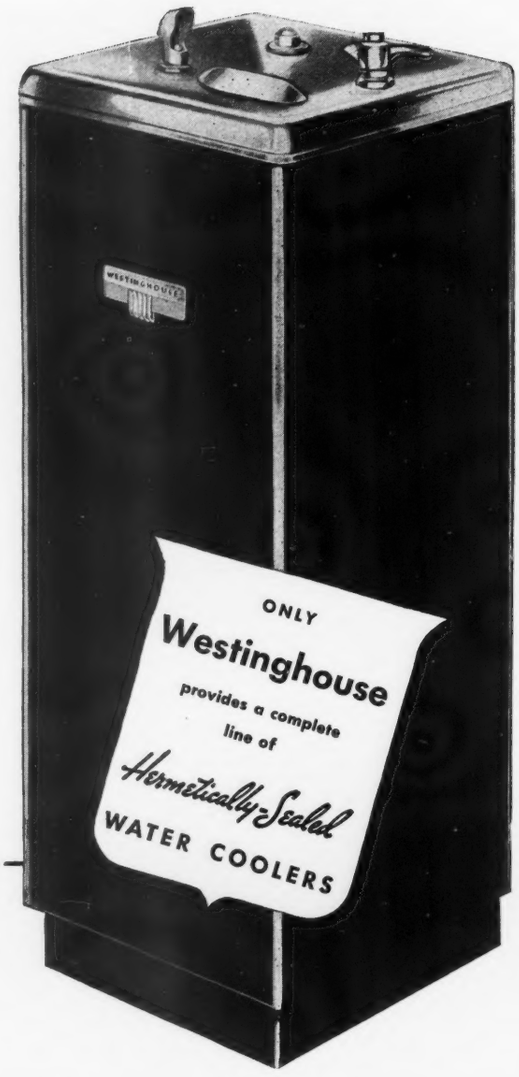
Because it is Hermetically-sealed, Westinghouse provides a plan for five years protection on the sealed-in mechanism. This is based on the EXTRA years of trouble-free performance which experience shows you can confidently expect.

• • •

Westinghouse

WATER COOLERS

Explosion-proof models available



FREE. Ask your Westinghouse dealer for free copy of a useful folder—"How to Check Drinking Water Costs" or mail this coupon to—Westinghouse Electric & Manufacturing Company, Section 9043, Mansfield, Ohio.

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From TOP TO BOTTOM

Carey PRODUCTS

Carey Bonded Built-Up Roofs

Engineered to the individual requirements of each job — bonded to give definite years of repair-free, trouble-free service . . .

Carey Corrugated Siding

Made of asbestos and Portland Cement — meets industry's requirements for fireproof, rust-proof siding that will stand unusual stress, requires no painting or other upkeep—that is low in first cost and economically applied . . .

Carey Rocktex Insulation

Assures maximum control of temperature the year around — fireproof, rot-proof, chemically stable. Made in Bat, Wool and Granulated, to meet varying installation requirements . . .

Carey Industrial Flooring

Tough, resilient, silent, non-skid, vermin and termite-proof—highly resistant to rough usage. Quickly applied, easily repaired, if damaged . . .

Carey Heat Insulations

Meet every service condition from sub-zero to 2500° F. Usually return investment in a year or less; thereafter pay big annual dividends . . .

Carey Paints, Waterproofing

Protect basements against seepage of ground water and dampness. Insure a dry cellar. Prepared — ready for use. Can be easily applied by unskilled labor.

Build Low Upkeep into Modernization Jobs . . .

Especially well adapted to present day remodeling of commercial and industrial structures,

CAREY PRODUCTS

meet the architectural requirements of properties in which improved appearance, reasonable first cost and low upkeep are essentials.

In the development of these and other products giving extra service and better performance, Carey Research has provided new ways of modernizing industrial buildings.

Carey distribution and contract organizations in all principal cities will give you complete engineering service.

Call the nearest Carey Branch Office—or write today for Catalog. Address Department 31.

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio

Dependable Products Since 1873

BRANCHES IN PRINCIPAL CITIES

p&h ELECTRIC CRANES

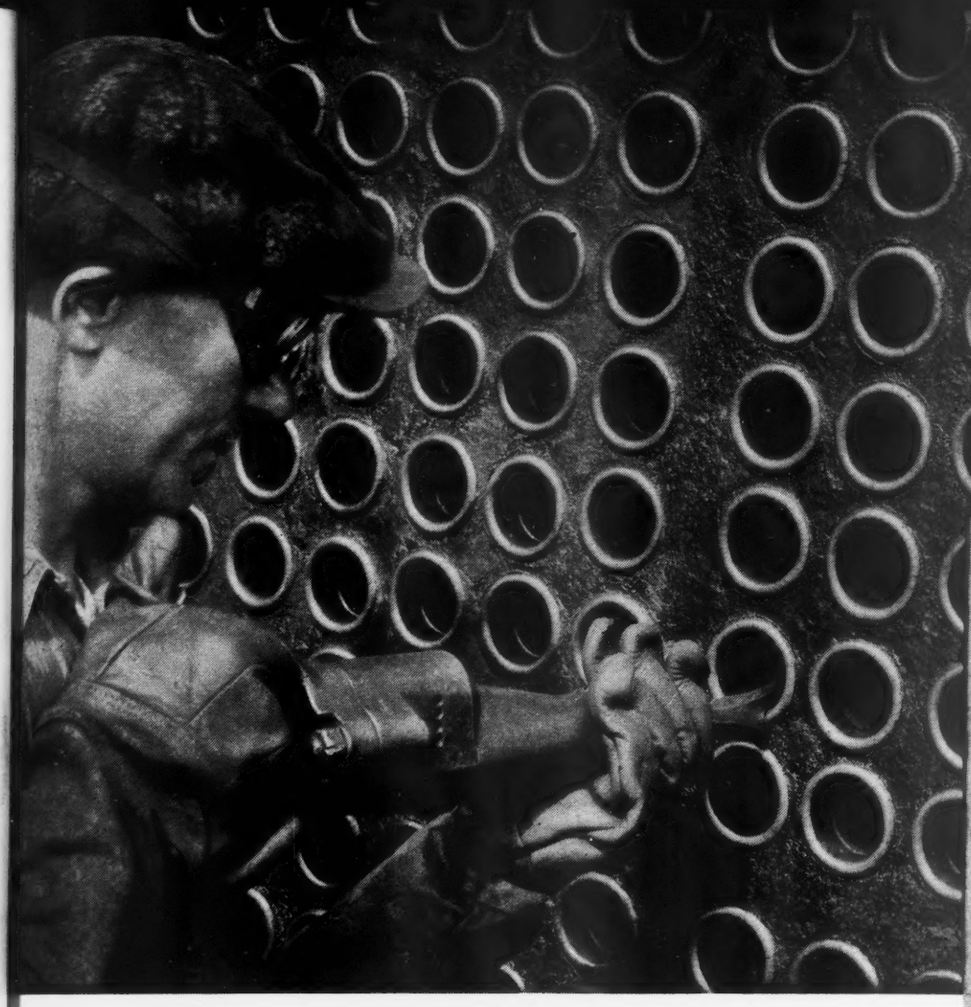
Today, more than 10,000 P&H cranes are at work moving heavy materials in American industrial plants. With larger volume than any other builder, P&H now manufactures various standard types of industrial cranes on a production basis — a means of considerable saving to the crane user, both in first cost and in the purchase of parts and accessories. For literature, address the Harnischfeger Corporation, 4525 West National Avenue, Milwaukee, Wisconsin.

ALL CAPACITIES FROM 5 TO 300 TONS

CRANE BUILDERS FOR MORE THAN 50 YEARS

HARNISCHFEGER CORPORATION

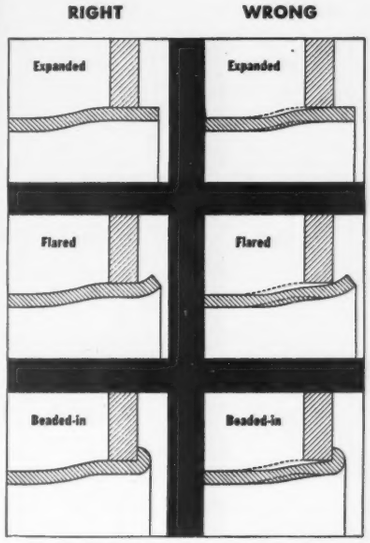
ELECTRIC CRANES ★ EXCAVATORS ★ ARC WELDERS P&H HOISTS ★ WELDING ELECTRODES ★ MOTORS



Why High Ductility is Vitally Important

(a) Jones & Laughlin Seamless Tubes with their high ductility form a smooth, tight joint and "stay put" permanently...when they are expanded, flared and beaded in. See diagrams below.

(b) Tubes not sufficiently ductile resist forming and tend to pull away from the boiler plate. Such tubes require longer time for working and leaveimperfect joints. See diagrams below.



J & L manufactures a complete line of seamless and welded steel tubular products. This includes seamless pressure tubes, condenser and heat exchanger tubes.

• • •

Flange steel plates and firebox steel.

Here is why you get QUICK, easy installation, longer life and greater safety with

J&L SEAMLESS STEEL BOILER TUBES

When boilers get the shut-down habit, Jones & Laughlin Seamless Steel Boiler Tubes will help you get them back on the job in a hurry. J & L Tubes roll in faster and then stay put. They keep your boilers working efficiently and economically because every length of J & L Boiler Tubes has built into it an extra margin of strength, safety and high ductility.

The exclusive method by which Jones & Laughlin Tubes are manufactured is responsible for their time and money-saving features. Every tube is rolled from a solid billet of selected steel. There are no welds — therefore, no weak spots where a rupture can start.

This strength and durability built into Jones & Laughlin Tubes mean that boilers equipped with them stay on the job longer and with fewer costly shut-downs.

The next time you need boiler tubes, call your Jones & Laughlin Boiler Tube distributor. You will get tubes which give you low installation cost . . . which last longer . . . and you will get them quickly.

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

MAKERS OF HIGH QUALITY IRON AND STEEL PRODUCTS SINCE 1850

J & L—ALWAYS MAKING FINER CARBON STEEL PRODUCTS FOR NEW AND BETTER USES

CLOSE CLAMPING JAWS AROUND CONDUCTOR.. conductors up to 2" dia.

READ AC CURRENT ...1 to 500 Amperes

Now! A WESTON MULTI-RANGE CLAMP-AMMETER

Providing

BROADER UTILITY
MAXIMUM SAFETY
GREATER ECONOMY!

With *no* connections to make, *no* interruption of circuits... the self-contained WESTON Model 633 Clamp-Ammeter provides a simple, quick method of measuring AC current flow through insulated or non-insulated conductors. Remote indications, too, may be had... up to 50 feet from the clamping jaws... by plugging the quickly detachable instrument into a special carrying case available for the purpose. Some of the outstanding features of this new Clamp-Ammeter are described at the right. In addition, Model 633 is *attractively priced.* Complete details may be had from the WESTON representative near you, or by returning the coupon below.

6 current ranges ...10/25/50/100/ 250 and 500 amperes

For insulated or non-insulated conductors up to 2" diameter

Sturdy bakelite case, handle and trigger... for maximum safety

Clamping jaws heavily insulated ... protects operator ... prevents short circuits

·WESTON instrument ... assures long, dependable service.

Accuracy guaranteed within 3% between 50 and 70 cycles.

Temperature error less than 1% from 32° to 110° Fahrenheit

Man sized handle ...proper balance for easy handling

Weston Electrical Instrument Corporation,
628 Frelinghuysen Avenue, Newark, New Jersey.

Send literature describing the new WESTON Clamp-Ammeter.

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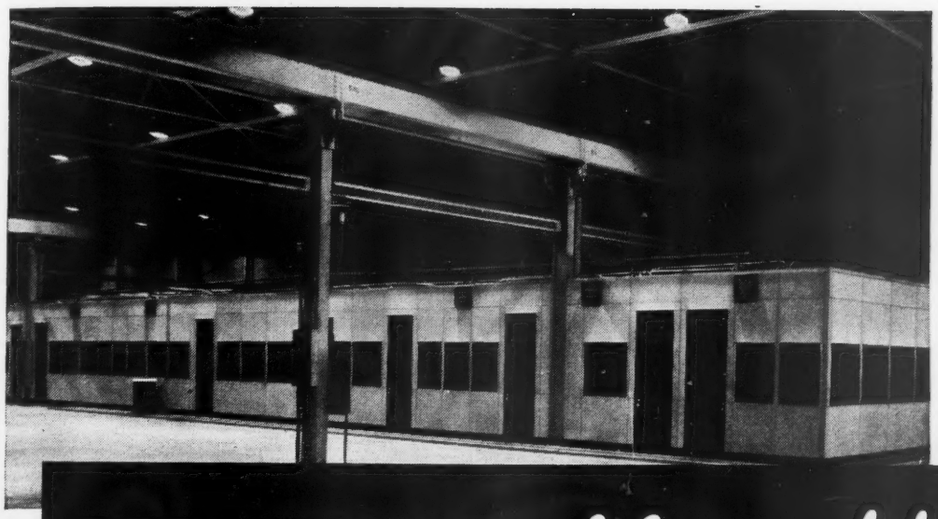
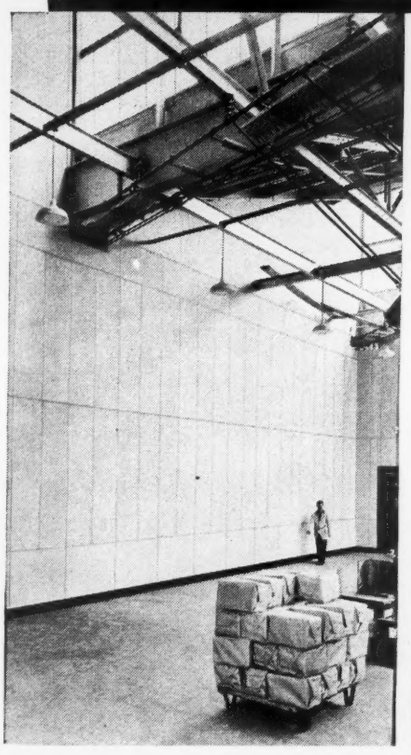
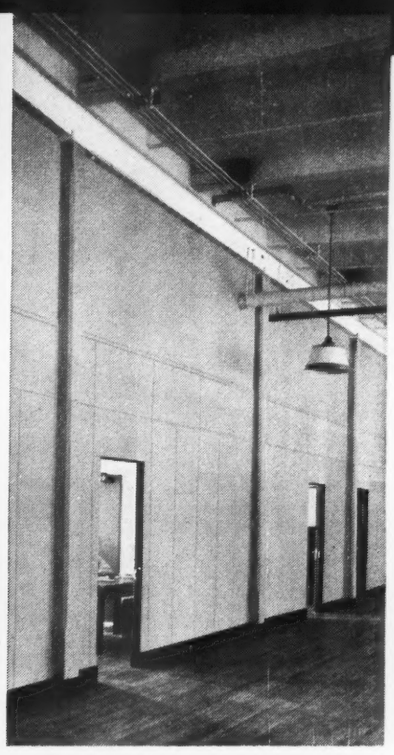


MANY INSTALLATIONS of Transite Walls are in service in the various plants of the Aluminum Company of America. On this installation, at the LaFayette, Indiana, plant, this modern material was chosen because anticipated future relocation can be accomplished quickly and economically . . . with 100% salvage of materials.

PERMANENT, *Movable* WALLS FOR FACTORY OFFICES



HIGHEST MOVABLE PARTITION ever built is at the Hoboken plant of the Alco Gravure division of Publication Corp. Here Transite Walls, erected with standard parts, reach a height of over 36 feet. The simple construction method made installation easy, rapid and economical . . . will permit future changes or complete reconstruction with 100% salvage of materials.



EXECUTIVE OFFICES were easily constructed in this General Electric factory building at Schenectady, New York. Partitioned with Johns-Manville Transite Walls, offices are as quiet and private as though fixed partitions had been used. Furthermore, because of Transite's asbestos-cement composition, these modern walls cannot burn, rot or decay.

As plant-office partitions, J-M Transite Walls give the same solidity and privacy as fixed walls . . . make relocation and future changes easy and economical

NO OTHER partitioning material offers the same advantages for plant offices as J-M Transite Walls. Made of two permanent minerals, asbestos and cement, they are strong and durable . . . highly resistant to cracking and denting, even under severe abuse.

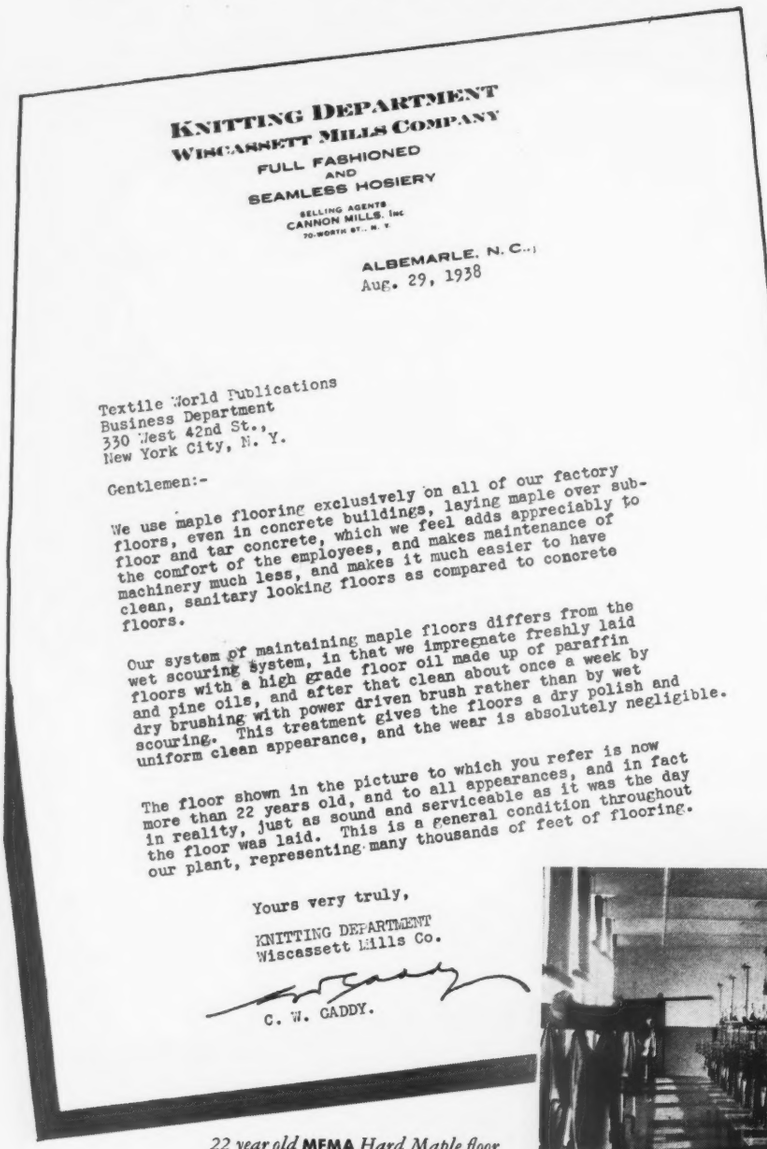
Extra safety is added to interior factory construction because these modern partitions are completely fireproof and rotproof. They offer unusual resistance to sound transmission . . . keep offices quieter and increase privacy. A unique construction method makes initial erection easy and rapid, permits 100% salvage of all materials when changes are necessary.

For complete information, ask for brochure TR-19A. Write Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville TRANSITE WALLS

"The flooring in our plant is of *Northern Hard Maple* *such as is sold by the* MFMA*"

says C. W. GADDY, Supt. and Mgr., Knitting Department, Wiscassett Mills Company



KNITTING DEPARTMENT
WISCASSETT MILLS COMPANY
FULL FASHIONED
AND
SEAMLESS HOSIERY
SELLING AGENTS
CANNON MILLS, Inc
70 WORTH ST., N. Y.

ALBEMARLE, N. C.,
Aug. 29, 1938

Textile World Publications
Business Department
330 West 42nd St.,
New York City, N. Y.

Gentlemen:-

We use maple flooring exclusively on all of our factory floors, even in concrete buildings, laying maple over sub-floor and tar concrete, which we feel adds appreciably to the comfort of the employees, and makes maintenance of machinery much less, and makes it much easier to have clean, sanitary looking floors as compared to concrete floors.

Our system of maintaining maple floors differs from the wet scouring system, in that we impregnate freshly laid floors with a high grade floor oil made up of paraffin and pine oils, and after that clean about once a week by dry brushing with power driven brush rather than by wet scouring. This treatment gives the floors a dry polish and uniform clean appearance, and the wear is absolutely negligible.

The floor shown in the picture to which you refer is now more than 22 years old, and to all appearances, and in fact in reality, just as sound and serviceable as it was the day the floor was laid. This is a general condition throughout our plant, representing many thousands of feet of flooring.

Yours very truly,

KNITTING DEPARTMENT
Wiscassett Mills Co.

C. W. GADDY.

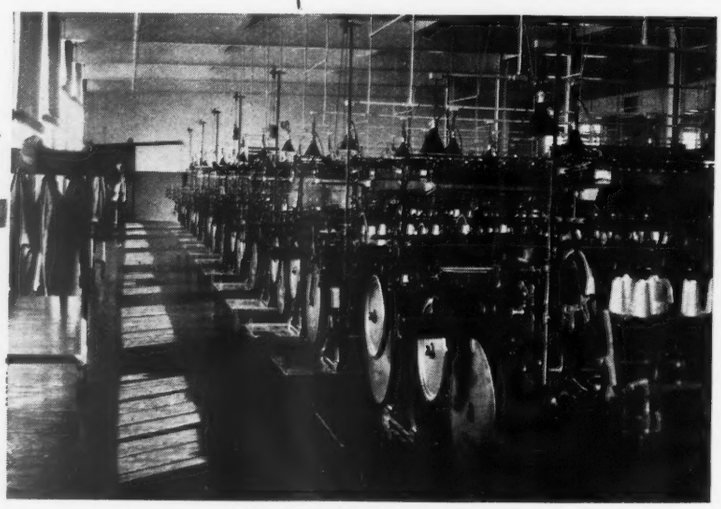
22 year old **MFMA** *Hard Maple floor in the Full Fashioned knitting room, Wiscassett Mill Company, Albemarle, N. C., described in letter shown.*

"22 years old and as good as new"..."Stays easier to clean and keeps free from lint"..."Lowers maintenance"..."The wear is negligible"—these are facts familiar to mill experience with Northern Hard Maple floors.

But modern operators also know *these* facts: Not all Maple is *Northern Hard* Maple. Only this remarkably *tough-fibred, tight-grained* Maple offers this outstanding performance. It pays to make sure of *Northern Hard* Maple flooring. The simple way to do this is to specify **MFMA*** Maple. This trademark guarantees that this flooring is *Northern Hard* Maple, conforming to the grade specified, as established by the Association. Specify **MFMA**, and you protect your flooring investment.

MAPLE FLOORING MANUFACTURERS ASSOCIATION
1793 McCormick Building, Chicago, Illinois

See our catalog data in Sweet's, Sec. 11/77. Write for photographic folder on Northern Hard Maple and leaflet on heavy-duty finishes for old or new floors.



*The **MFMA** trademark, indented and stamped on Maple flooring, guarantees it to be all Northern Hard Maple, graded in accordance with the Association's exacting grade standards.

Floor *with* MFMA Maple

(REG. U. S. PAT OFF.)

(NORTHERN HARD)

A NEW BOOK!

"The Meaning of the RLM *Label"*

Today more than ever before, those who purchase and specify products for use in industry are insisting upon basic standards by which they may judge accurately the value of the product from quality and performance standpoints.

In the field of Industrial Light Conditioning, the RLM STANDARDS INSTITUTE is meeting this demand by establishing standards of efficiency, design and quality for Industrial Lighting Reflectors.

The necessity for these standards, what they are and how they may be used to insure proper specification of lighting equipment from both the viewpoint of cost and performance is the subject of the booklet—"The Meaning of the RLM Label."

Into the book has gone the composite experience and knowledge of the engineering departments of the leading manufacturers of lighting reflectors associated in the RLM STANDARDS INSTITUTE.

This book is available without cost to industrial executives, consulting engineers, illuminating engineers, plant engineers, purchasing agents and all others interested in the proper specification and installation of industrial lighting equipment. Your request for a copy is most cordially invited.

The letters RLM stand for Reflector and Lighting equipment Manufacturers

RLM STANDARDS INSTITUTE
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THE CERTIFICATE OF RLM UNIFORM QUALITY

Every Kind of Steel You Need

In Stock—Ready to Use for New Construction Maintenance and Repair . . .

New billet and rail steel reinforcing bars are quickly cut and bent to specifications, bundled, tagged and delivered on the job ready for the forms.

Complete, modern flame cutting equipment quickly and accurately cuts special shapes and parts from heavy plates and billets.

No waiting—no delay—the steel is in stock ready for immediate shipment.

Start today—save time and speed your construction and maintenance work by getting immediate shipment of the steel you need from a nearby Ryerson plant.

Whatever it is—expanded metal for partitions and shelves or the heaviest structurals—foundation bolts or the finest stainless, you can be sure that Ryerson will accurately cut and form the material to your specifications and ship at once.

In addition, you get Ryerson CERTIFIED quality steels—steels that represent the highest grade obtainable in each particular type of material. You are assured the strength—finish or fabricating qualities required in each grade—and at no extra cost to you. There are ten Ryerson plants with complete stocks and modern equipment ready to meet your requirements.

Check through the partial list of products shown below. If you do not find what you need, turn to the Ryerson Stock List. It shows the largest and most complete stocks of steel and allied lines available for immediate shipment.

Partial List of Products in Stock:

Beams, Structurals	Plates (over 15 kinds)	Mechanical Tubing
Channels, Angles	Sheets (over 25 kinds)	Boiler Tubes and Fittings
Tees, Zees	Alloy and Tool Steels	Welding Rod
Hot Rolled Bars	Heat Treated Alloy Bars	Rivets, Bolts, Nuts, Washers
High Tensile Steels	Stainless Steel	
Bands and Hoops	Cold Finished Shafting	Concrete Reinforcing
Floor Plate	Strip Steel, Flat Wire	Babbitt Metal and Solder

If you do not have the current Ryerson Stock List, write and we will mail a copy at once.

RYERSON

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON CERTIFIED STEELS

Certified STEELS

Build the Plant Around the Process

PRESSURE FOR LOW-COST PRODUCTION INCREASES. Never has it been so necessary to offset fixed costs by increased manufacturing efficiencies. Never have the handicaps of unsuitable plant buildings been more apparent.

"Build the Plant Around the Process." That is FACTORY's slogan in this fifth annual special treatment of the subject "Industrial Plant Buildings." When buildings and process fit each other, wastes are eliminated. Correct layout prevents useless movement of materials, ineffective procedure by employees, consumption of time to no purpose.

Perhaps the greatest contribution of modern buildings to economy in manufacture lies in the inherent advantages of the straight-line production they permit. Sometimes the straight line is vertical, sometimes horizontal, sometimes a combination of the two. In any case, no backtracking.

Multi-story buildings serve vertical straight-line production. Gravity, that costless handler of materials, is made use of. Multi-story buildings can also serve horizontal straight-line production in parallel levels when plants must be built in localities where land is costly or scarce.

Single-story buildings serve horizontal straight-line production. Where gravity flow is not essential, or does not contribute appreciably to cost reduction, the building of today is the single-story structure. Which means that the tendency is to build away from congested centers of population, in order to secure sufficient land at permissible prices.

But that is only one tendency in location. There are many others. Among them: To locate as near as possible to the center of the product market. To the sources of raw materials. Where power and fuel costs are most favorable. Where transportation facilities are best. Where

Entrance to the new Ternstedt plant of General Motors, at Trenton. This is a good example of the plant built around the process, resulting in straight-line manufacture. Worker comfort was thoroughly considered in building design. Neighbor comfort was insured in dust control and sewage disposal. Albert Kahn, Inc., Detroit, Architect and Engineer

water supply is suited. Where the right kind of factory labor is available. Where both the local and the state taxes are favorable.

To the advantages of a good location add the advantages possible in modern buildings: Large manufacturing areas because of relative freedom from columns. Opportunity to put service lines below floor level (wiring, piping, even mechanical power transmission). Air conditioning. Extraordinary natural lighting. Artificial lighting that is no less extraordinary. Comfortable working conditions that can reach their maximum only in new buildings. Availability of new building materials and equipment.

Next to new buildings in effectiveness are modernized buildings. Financial position may make new buildings impossible, estimates of future business may fail to justify them, yet obsolete or inadequate buildings may be responsible for manufacturing costs that prevent profitable marketing. Under those conditions modernization is imperative. Changes can be made to approximate building the plant around the process.

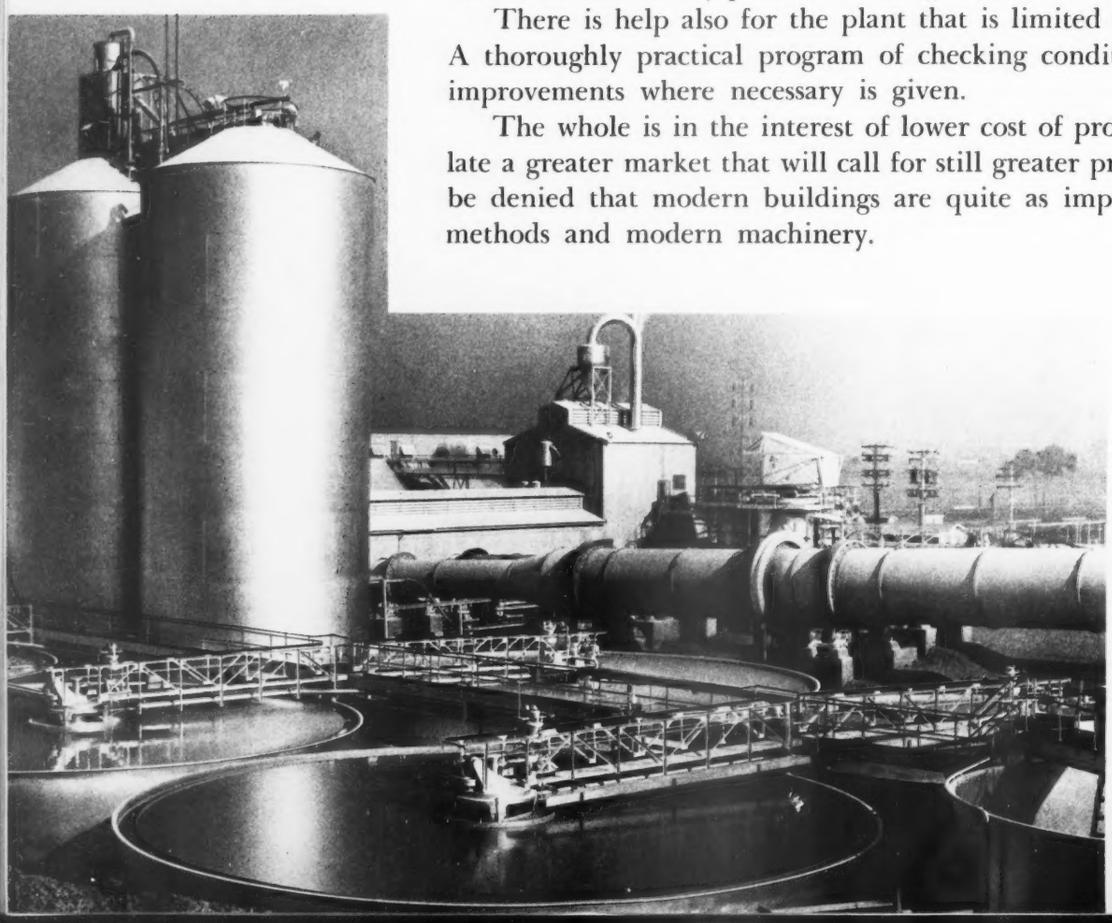
In any major building program, whether of new construction or modernization, the services of the building specialists—architect, engineer, contractor—are most likely to be necessary and profitable.

The men who run the plant must supply the knowledge of processes and equipment without which the building specialist cannot work. And the services of the specialists will be the more effective if the plant operating men who deal with them have a real conception of what can be done to "build the plant around the process."

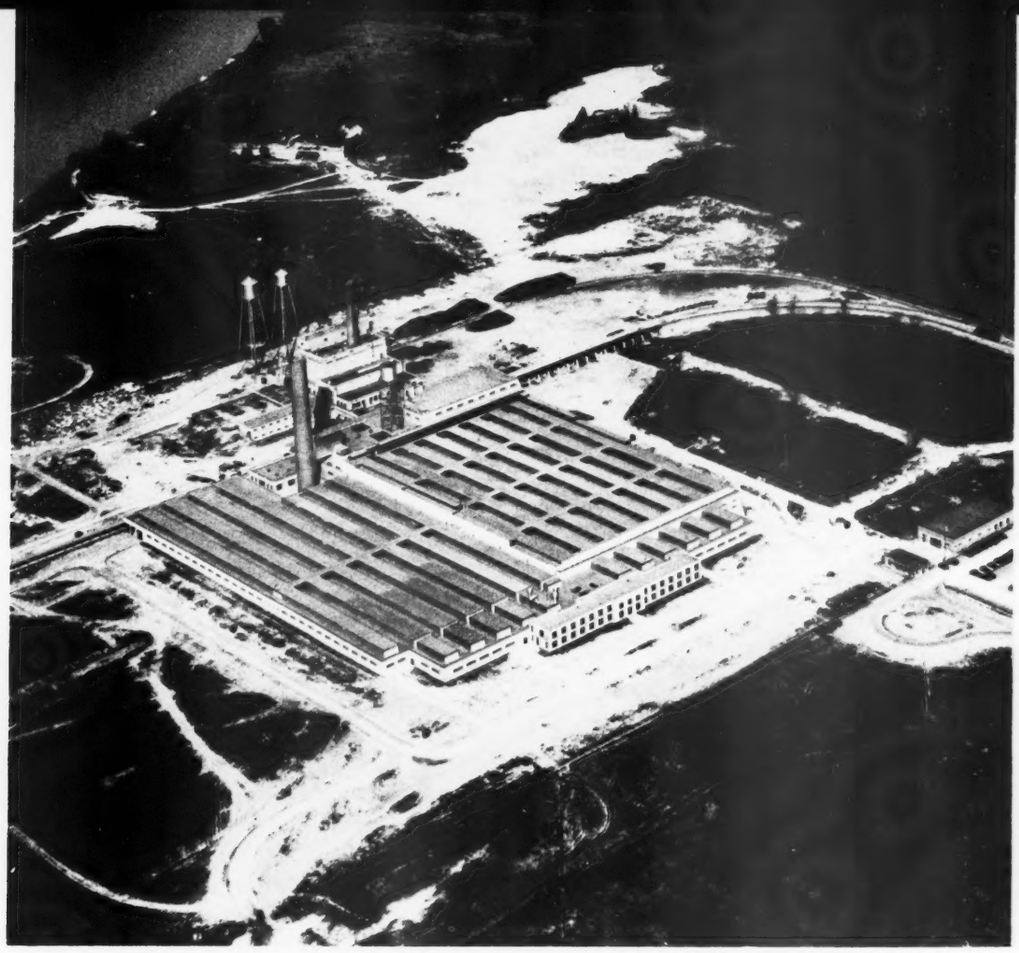
In the following pages FACTORY tells the stories of six plants recently built, thoroughly modern. No one of them faced exactly the problems that had to be solved by the others. Their combined experience should aid any plant in meeting its new building problems.

There is help also for the plant that is limited to modernization. A thoroughly practical program of checking conditions and making improvements where necessary is given.

The whole is in the interest of lower cost of production to stimulate a greater market that will call for still greater production. It can't be denied that modern buildings are quite as important as modern methods and modern machinery.



New magnesite plant of Westvaco Chlorine Products Corporation, Newark, Calif. A plant built around a process. Layout involved not only the design and location of buildings, but a complexity of tanks and bins, and a water purification system with its distribution lines. The H. K. Ferguson Company, Cleveland, Engineers and Builders



Located on Lake Erie, from which it pumps its daily requirement of 15,000,000 gallons of water, Industrial Rayon Corporation's new $11,500,000 plant is served by three railroads. Water, plus transportation facilities, plus room for expansion, determined the location

BUILD THE PLANT AROUND THE PROCESS

Industrial Rayon Corporation

PAINESVILLE, OHIO

ENGINEERS
Wilbur Watson & Associates, Cleveland
CONTRACTORS
Hunkin Conkey Construction Company
Cleveland

INDUSTRIAL RAYON'S new plant at Painesville, Ohio, literally is built around a process – the continuous spinning of rayon. On a new type machine the yarn is desulphurized, bleached, finished, dried, and twisted. The sequence requires 4½ to 5 minutes, as compared with 85 to 90 hours for discontinuous methods. Spinning machines stand 20 feet high and are operated from three levels.

Materials handling methods and routing take maximum advantage of gravity flow throughout all stages of the operations. Incoming materials are received over an elevated trestle. Fluid chemicals are piped directly from tank cars to large storage vats on the top floor of the three-story chemical building, while dry materials are conveyed to bins and other storage receptacles on the same floor. The materials move downward to process storage tanks in the basement and are pumped up to the continuous spinners on the first floor by air compressors.

The plant is windowless and air conditioned. Temperature and relative humidity are zone controlled, by thermostats. Daylight enters

through glass blocks used in the roof monitors, and through wall panels of glass block. Artificial lighting is engineered to the job to secure optimum illumination without glare, and to provide operator comfort.

Working conditions deserve high praise. Air conditioning and right lighting contribute to them. Add plenty of lockers, modern washrooms, bathing facilities, an extensive cafeteria served by an electric kitchen, and a completely equipped dispensary.

More than usual thought and care went into the lighting installation. In the huge spinning room, for instance, the final job is the result of much experimental work on full-scale models. The system here is a combination of directional and diffusing luminaires.

Located on Lake Erie, the plant is served by spurs of the New York Central, the Nickel Plate, and the Baltimore & Ohio. This availability of ample transportation facilities influenced selection of the site. So did the plentiful supply of water, for which there is a daily requirement of 15,000,000 gallons. Room for expansion was still another contributing factor. Floor space now is 14 acres, will have to be much more some day, in all probability. At present, in the spinning room alone, floor space totals 3½ acres.

Manufacturing (spinning and coning) is done in a single-story building which constitutes the major portion of the plant proper. Other units are a multi-story building for preparation of the chemicals used in the process, a water-treating plant, a power house, a water-intake unit, an administration building, an employment office, and a cafeteria.

Glass Block Monitors

Largest room is the one devoted to spinning. It is 450 x 320 feet. Bays of this room are 54 x 40 feet, with a glass block monitor located over each.

Size of the plant is indicated by the quantities of building materials entering into construction. For example, 371,000 glass blocks; 5,600,000 bricks (including 1,500,000 salt-glazed bricks used on the interior walls); 5,500 tons of steel; 35,000 cubic yards of concrete; 50 miles of pipe, 12 of which are of hard rubber. 1,800 tons of mechanical refrigeration are required daily, 1,500 tons of which are used in the air-conditioning system.

A knowledge of the design and characteristics of the plant is gained from a consideration of the building materials and equipment employed. The major list is as follows:

Foundations, concrete. Walls, gray brick (damp-proofed below concrete). Partitions, glazed tile except in offices. Columns, reinforced concrete in basements and in multi-story buildings, otherwise steel.

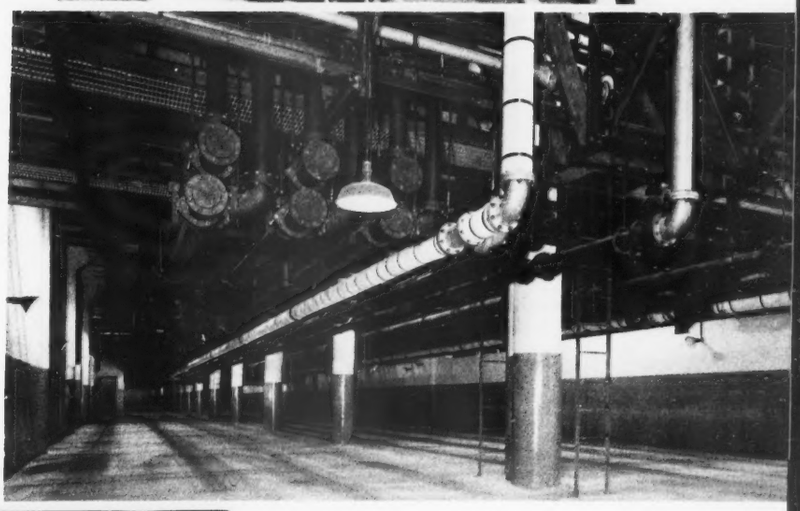
Floors, cement, asphalt and steel, or wood, to fit the process. Roof (over single story), exposed structural steel with treated wood sheeting and 4-ply tar and gravel roofing. Flashings and gutters, aluminum. Roof insulation, 2 inches. Ceiling insulation (in offices), sound-absorbing material.

Floor coverings, some rubber tile, some linoleum carpets. Wood and metal trim (office), black walnut and oak. Plumbing, wrought-iron pipe for soil stacks and vents, galvanized wrought-iron pipe for cold and hot water.

Expenditure for buildings and equipment was $11,500,000.

This air-conditioned, windowless plant has 14 acres of floor space. Said to contain the largest area of glass block of any plant in America. Has a capacity of 12,000,000 pounds of rayon yarns per year. Will employ, ultimately, 1,000 people

In the spinning room. Aluminum and glass inclosures form hoods over the spin baths and spinning reels in the upper section of the machines. Directional and diffusing luminaires in combination light lower as well as upper portions of the machines. Concentrating units drive the light through the steel grills. Diffusers light the upper portion. Angle reflectors give high illumination close to the work. Interiors of machine are lighted by vapor-proof units. Aluminum is used freely in lighting fixures



Salt-glazed brick is used on interior walls. In this windowless corridor, the well-planned lighting gives high visibility, eliminates shadows, brings into clear relief air-conditioning ducts, sprinkler pipes, buffer-equipped doors, concrete floor, safety sign

Fifty miles of pipes serve the plant. Of hard rubber pipe alone there are 12 miles; diameters range from $1\frac{1}{2}$ to $8\frac{1}{2}$ inches. In the pipe lines as a whole, which are distinguished by 17 colors of paint, are carried ammonia, natural gas, viscose, steam, air, soda, oil, vacuum, raw water, condenser water, soft water, hard water, fire water, brine, CS_2, sulphuric acid

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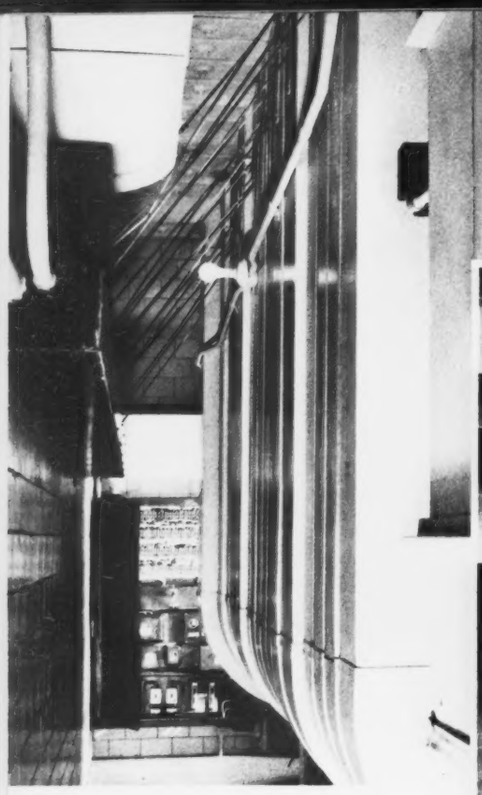
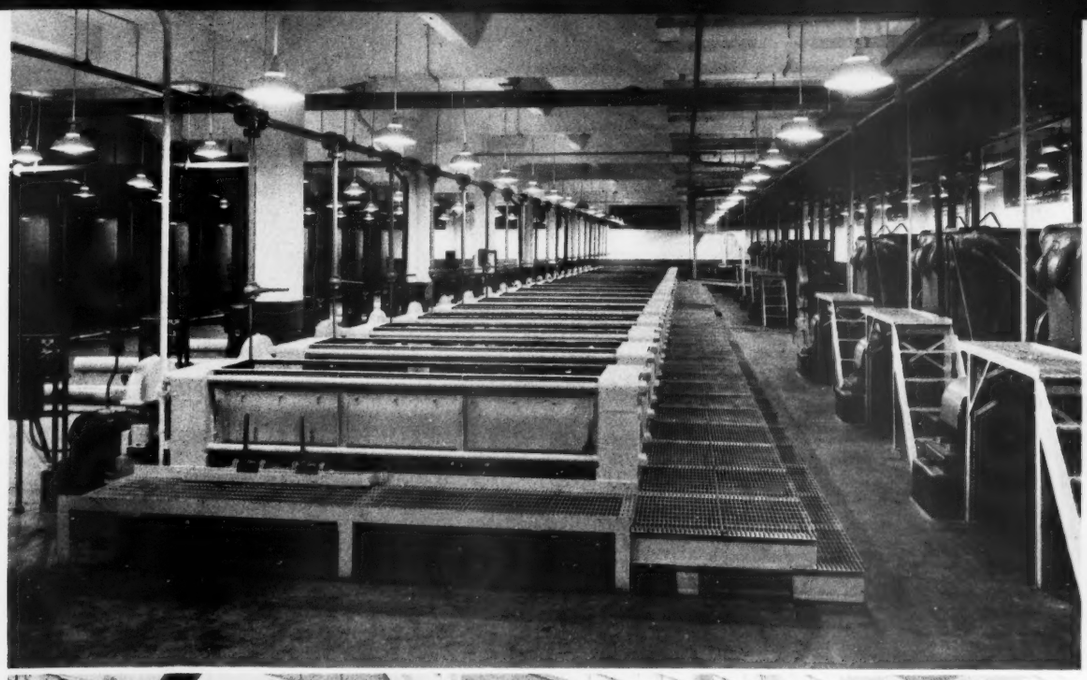


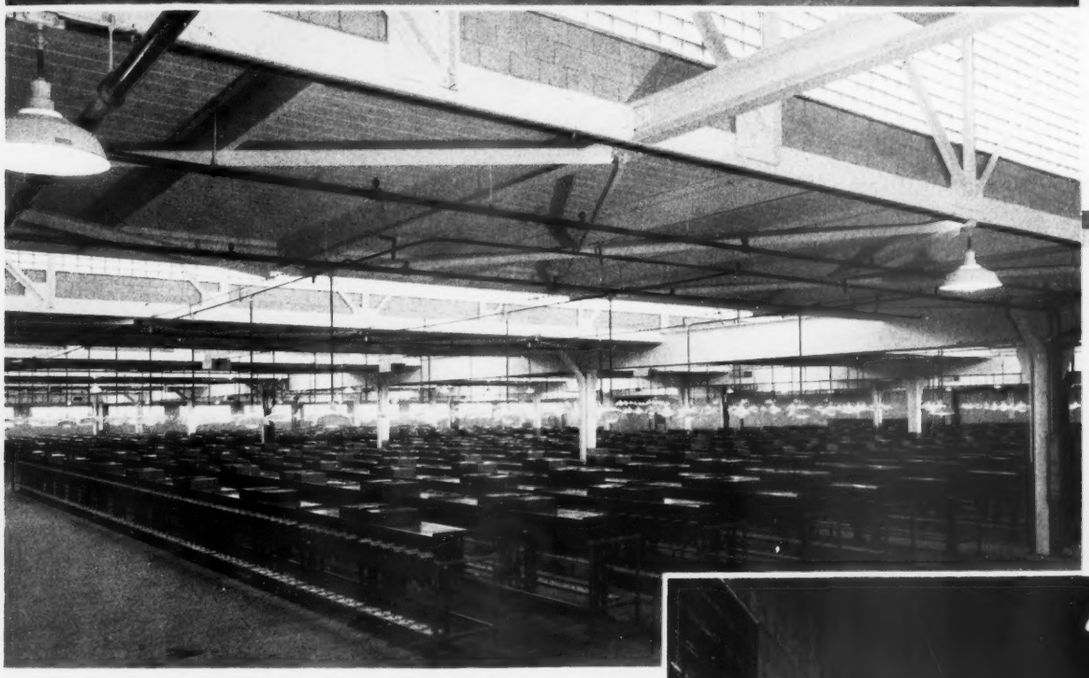
Air-conditioning ducts which serve individual offices. Humidity is controlled by a master humidistat; temperature, by thermostats in individual offices. In the cabinet in the background are the individual electrical controls

No excuse for slovenliness in this well-lighted, air-conditioned locker room. Everything in it makes for cleanliness — finished floor, gleaming tile walls, locker platforms, convenient waste cans

Seven hundred meals will be served daily in this well-appointed cafeteria served by an electric kitchen. Salt-glazed tile has been used throughout the side walls. Daylight enters through the glass blocks in the monitors

Like the locker room, this washroom insists upon cleanliness. No impediments to hosing down; nothing for water to harm. Men wash in running water. Plenty of light. No dark corners





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Maple floors are used throughout the coning room. Here is a fine example of the good natural illumination permitted by the glass blocks in the monitors. Again artificial illumination is tailored to the job

Grilled platforms (top photograph) are used extensively. Here they parallel the steeping presses into which cellulose fiber sheets are placed in the first stages of rayon manufacture. On the right are shredders; on the left, chemical storage tanks. Floor in this department is of acid-resisting concrete

Metal bins are used in the storeroom. Bin and stack luminaires direct vertical illumination on the shelves. Direct glare is eliminated in the normal field of vision by shields on the ends of the reflectors

Accounting and payroll office furnishes an example of the ensemble effect of an air-conditioned, scientifically lighted room with sound-absorbing ceiling and zone temperature control. Service outlets in the walls

The plant is well protected by its fence and outside lighting. Floodlights are mounted on top of the buildings. Main approach to the company property is lighted by octagonal luminaires on tall standards

Serving the manufacturing division and maintenance department is this large machine shop

Out goes the yarn from the long concrete shipping platform of car-floor height. Roll-up doors provide egress; a cantilever canopy provides protection, makes for safety

Aerial view of Standard Register Company's plant, with its air-conditioned and soundproofed office building in the foreground, and the new press building extending toward the upper left corner. First floor of the press building houses daylight pressroom and allied printing departments. Second story (at far left) contains shipping department for assembly and shipping of continuous-fed business forms

BUILD THE PLANT AROUND THE PROCESS

The Standard Register Company

DAYTON, OHIO

DESIGNERS AND BUILDERS
The Austin Company, Cleveland

A TYPICAL EXAMPLE of the modern manufacturing establishment that is built around the process is found in the newly enlarged press shop where The Standard Register Company makes its perforated multiple business forms.

Planned for maximum flexibility of operations and efficient handling of roll stock, the building is 150 x 360 feet, has maximum unobstructed areas. Its modern façade, with continuous horizontal sash, acquires unusual distinction from the introduction of glass block in the monitors, which are carried out to the front of the building. Vertical panels of glass block extending upward 14 feet from each entrance canopy provide striking contrast with the horizontal sweep of glass that runs for 400 feet around each monitor. Glass block was chosen for its light-diffusing qualities.

Low-pressure mercury-vapor tubes in combination with Mazda bulbs provide uniform lighting of 20 foot-candles at the working plane.

Comfortable working conditions are obtained through the installation of "heat valves." When fully open they provide air outlets 18 inches wide and 150 feet long in the high point of each monitor. With this type of ventilating unit there is no chance for dirt and dust to sift down on the presses.

Blower-type heating units are equipped with individual thermostatically controlled dampers; they supplement natural circulation during the summer months.

Power lines and other service facilities are carried in trenches with easily removable steel floor plates. Concealment of pipes and wires in this manner has reduced all interior obstructions to the minimum and

Glass block and stainless steel make the new office building entrance well worth looking at

facilitates free-flowing, straight-line operations.

The building is single story except at one end where a second story contains the collating department for assembly of the forms printed in the press shop below. The first floor is of reinforced concrete construction, with columns on 20-ft. centers. The second floor is of structural steel with a 60-ft. monitor aisle.

A large modern office building, affording 50,000 square feet of floor space, rounds out Standard Register's modernized facilities. This structure has two stories and basement, the latter including an auditorium, record vault, display room, and space for a cafeteria.

Glass block partitions throughout the two upper stories provide extraordinary distribution of daylight, which is further enhanced on the second floor by a monitor giving 24-ft. clearance above the general office floor. Natural daylight is supplemented by a combination of mercury vapor and Mazda indirect lights on 20-ft. centers. The glass block partitions are set in special rolled steel channel bases which provide raceways for the electrical conduit. This special base, together with hollow door jambs, permits concealment of wiring, which the extensive use of glass block would otherwise have rendered difficult.

The office building is equipped for year-round air conditioning. Water used in the cooling system is sprayed upon the roof, where a 2-inch standing pool minimizes summer heat absorption. For soundproofing, acoustical ceilings and asphalt tile floors were provided. Desks throughout the offices are equipped for built-in wiring.

A section of the general office, nicknamed the "Grand Central" because of its spaciousness and its 24-ft. ceiling. Glass block inclosed monitors, walls, and partitions help make the light just right. Lamps in fixtures with spun aluminum reflectors are spaced on 16-ft. centers. Office units are composed of four 200-watt Mazda lamps in combination with a 400-watt mercury-vapor lamp. Acoustic ceiling and asphalt tile floors make it a quiet place to work in

Assembly hall in basement of office building is 48x96 feet, seats 500 people, has a 20-ft. stage. Also in basement, motion picture projection room, display room, fireproof record vault, and room for a cafeteria

Men's washroom in office building has porcelain enamel toilet partitions, structural glass wall facing, and modern porcelain plumbing fixtures

Forms library contains sample sets from thousands of orders. Indexed and cross-indexed, hundreds of different register and business-machine forms make this library an invaluable reference source when a system is being devised or a form designed

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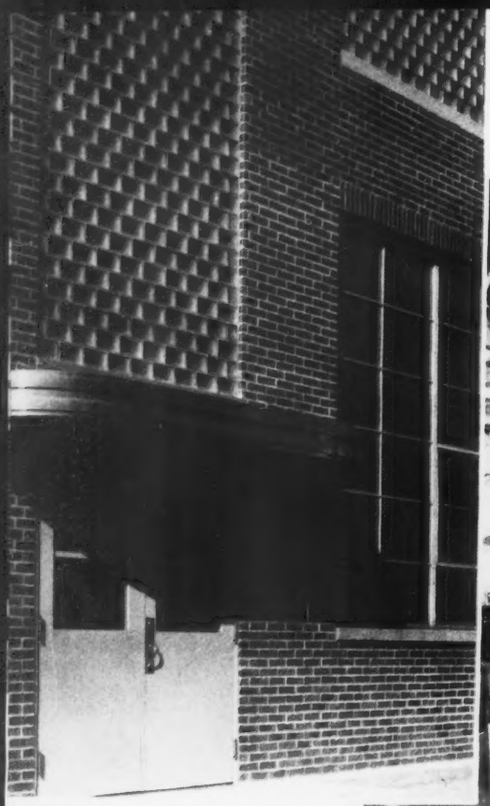
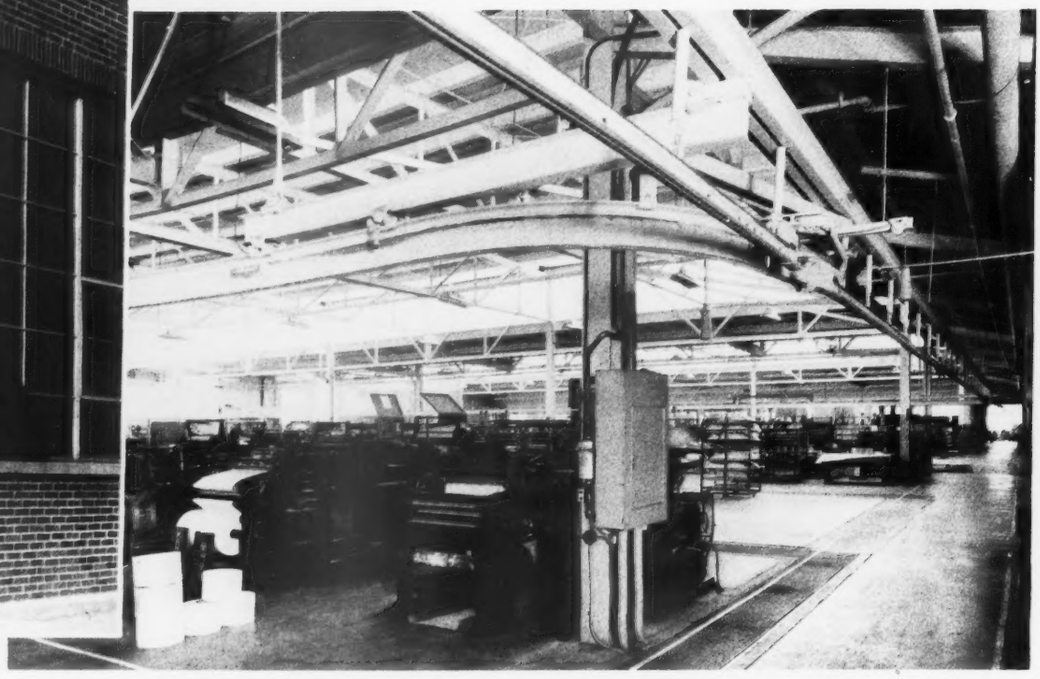


One of several entrances to the press building, with stainless steel canopy and vertical shaft of glass block. Continuous steel sash in side walls and horizontal bands of glass block in monitors provide an unusual amount of daylight



In the pressroom. Planned for maximum flexibility of operation and efficient handling of roll stock, the building has large unobstructed areas. Clearances are 17 feet 10 inches below the roof trusses in the 60-ft. monitor aisles and 14 feet in the three 20-ft. low aisles. Service facilities including power lines are carried in trenches with removable steel floor plates. Low-pressure mercury-vapor tubes and Mazda lamps in combination deliver 20 foot-candles. A 6-in. reinforced concrete floor provides live load capacity of 500 pounds

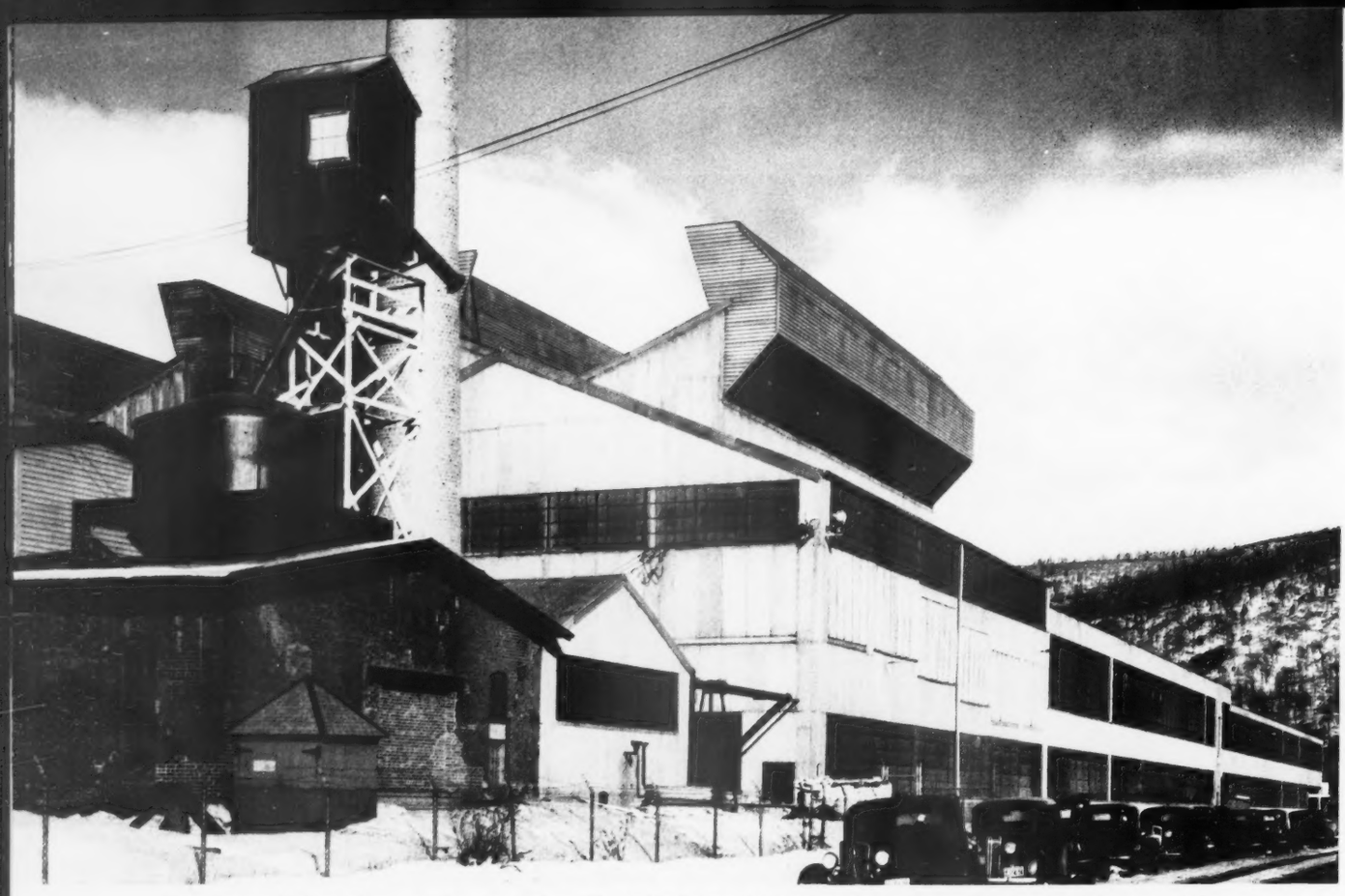
General view of shipping room with its long sections of gravity roller conveyor on which packaged forms are assembled to make up complete orders. Steel sash in side wall and monitor let in an abundance of daylight. Here as elsewhere in the plant a good job of painting adds many foot-candles to lighting intensities at working levels

Collating department on second floor of press building, where the perforated multiple business forms printed downstairs are folded and assembled. A monorail system conveys printed forms from the pressroom. Assembled forms on pallets move down the room via the power conveyor shown here. Color-corrective lighting is required because as many as 50 different shades of paper are used

Blower-type heating units equipped with individual thermostatically controlled dampers distribute warm air as needed to maintain uniform working temperatures throughout this unusual plant. The unit heaters are also used to circulate fresh air during the summer months, thus play an effective role in increasing worker satisfaction

Looking up at the underside of a monitor roof. Shows welded roof truss construction, also glass block monitor walls. Extending full length of each monitor is a continuous ventilator or "heat valve." These ventilators are operated by remote controls on the steel columns

Close-up of heat valve on top of one of the monitors; when wide open, it provides an air outlet 18 inches wide and 150 feet long. Glass block was chosen for the monitors because of its light-diffusing and high insulating qualities



New Pressed Ware Plant of Corning Glass Works' Fall Brook Division is built around the manufacture of Pyrex ware on a straight-line, mass-production basis. This view from the hot end of the building shows the four natural-draft ventilators located directly above the two continuous melting tanks. Walls of this structure are double corrugated iron with glass wool in between. And the roof is a wood deck with 10-year cover. This type of wall and roof construction was chosen because of the possibility of future expansion without interfering with present operations

BUILD THE PLANT AROUND THE PROCESS

Corning Glass Works

CORNING, N. Y.

ENGINEERS AND BUILDERS
The H. K. Ferguson Company, Cleveland

BUILT not only around the process but also with an eye to future expansion is the new Pressed Ware Plant of Corning Glass Works' Fall Brook Division, Corning, N. Y.

This is a 2-story steel structure, 160 feet wide, 625 feet long. It provides 200,000 square feet of space for the manufacture of molded glass (Pyrex) products on a straight-line, mass-production basis.

Manufacture starts at one end of the building with the two large continuous tanks from which molten glass is discharged into the automatic molding machines in which the pressed ware is made. From the molding machines it is conveyed to and through two long lehrs or annealing ovens, whence it emerges for final inspection and packing. Thus two straight production lines are provided, with never any of the backtracking that plays such a big part in keeping costs high.

Walls of this building are a double layer of corrugated iron with glass wool insulation in between. This type of construction was used to provide for further expansion. Floors are concrete, with some maple. Hot air generated at the furnace end of the building is removed

by four natural-draft ventilators in the roof. This, remember, is a glass plant and both process and working temperatures are necessarily high through part of the process. The ventilators, however, do much to relieve this unavoidable condition, and help make the plant a comfortable one to work in.

This built-around-the-process structure happens to be the latest of several additions to existing plant at Corning Glass Works. Newest of these are a warehouse completed late in 1937 and the Personnel Building that was occupied early in 1938.

Both of these buildings are all-welded steel structures with glass block and insulated brick walls — 4 inches of face brick plus 4 inches of glass wool insulation plus 4 more inches of brick on the inside. Both structures are built on concrete piles over a 14-ft. cinder fill.

The warehouse is a 3-story steel frame structure with 90,000 square feet of space. Five electrically operated overhead doors open into a loading dock 30 feet deep. A car-loading platform at car-floor height extends along one side. The roof is a wooden deck with a 10-year composition covering; the building was designed for two additional floors.

Provision for Expansion

Good daylighting is provided by horizontal bands of glass block on three sides of the building. The rear wall is of double corrugated iron construction with glass wool insulation and steel sash — again provision for expansion, laterally this time.

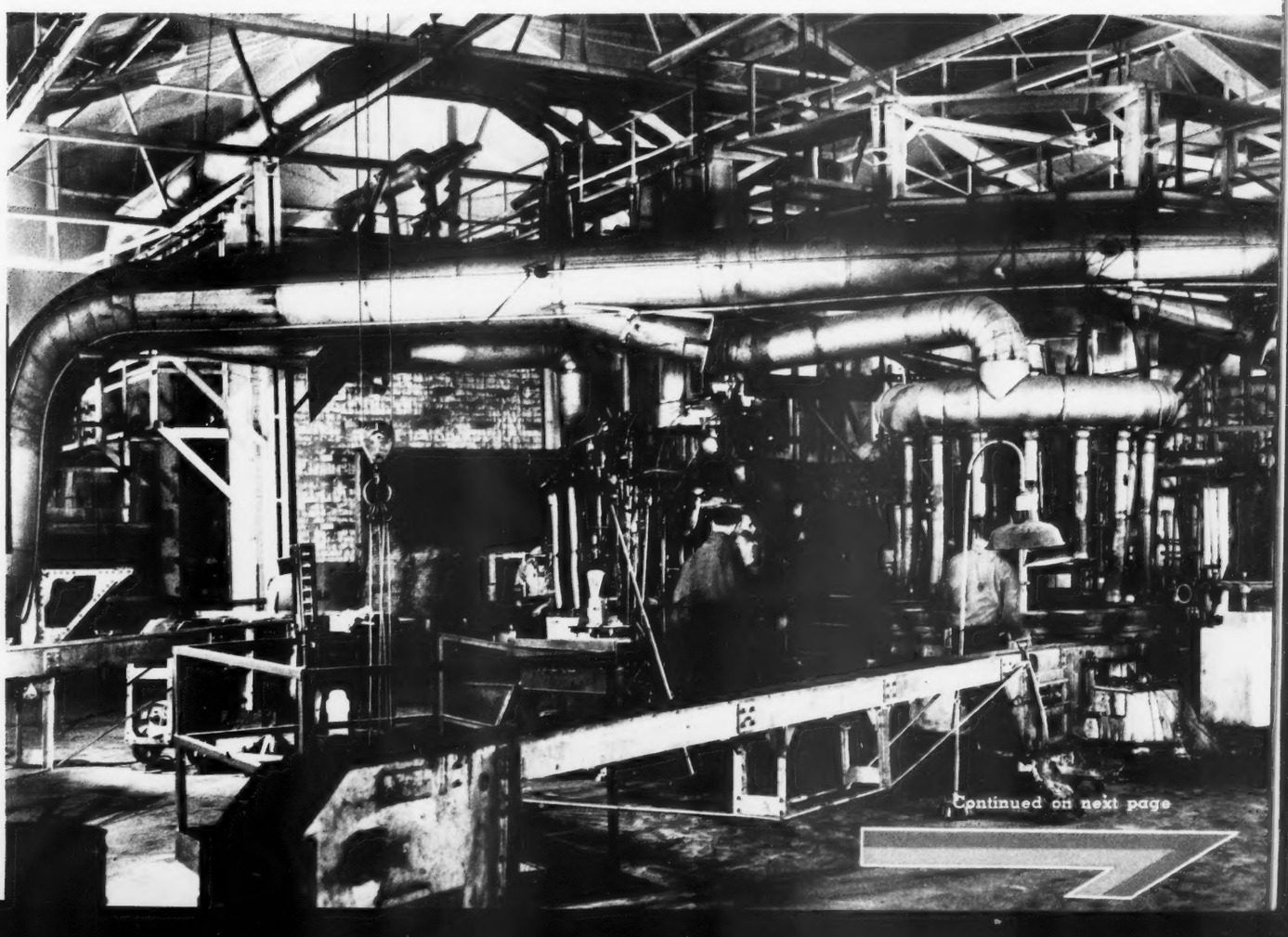
The first floor is concrete. The two upper stories are mill type with maple finish floors.

The Personnel Building is a 4-story structure, 60x100 feet. It is completely air conditioned, with the system designed to keep the temperature right around 72 degrees with 40 per cent relative humidity — which spells comfort.

It houses the employment department, first-aid rooms, a showroom, files, and a drafting room for the research department. The reason it does not contain the recreational and other facilities that one might expect from the name is because all these things are included in Memorial House, a club house for employees which was built some years back. This club house contains, among other facilities, bowling alleys and a fine swimming pool which are freely patronized by employees of the company.

Ceilings in the Personnel Building are of acoustic material for soundproofing purposes. And for the same reason floors are asphalt tile except in the drafting room where the floor is maple. The roof is a wood deck with 1 inch of insulation and a 20-year composition cover. Some interior partitions are pressed board, some glass block.

Where straight-line, mass manufacture of Pyrex products begins. In the background, the two large continuous tanks. In front of the tanks, the presses in which the ware is molded, and from which it is discharged to specially built conveyors like the one in the foreground. Conveyors take it to the lehrs for annealing. Note ventilating ducts which, together with the natural-draft units in the roof, do so much to make even this hot end of the plant a comfortable place to work in



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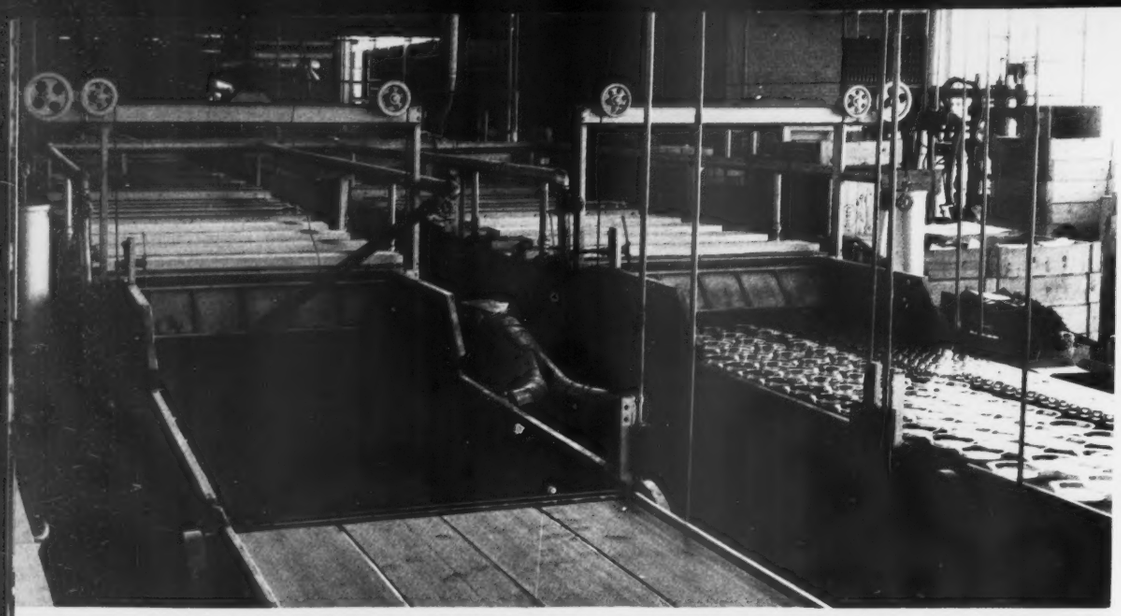
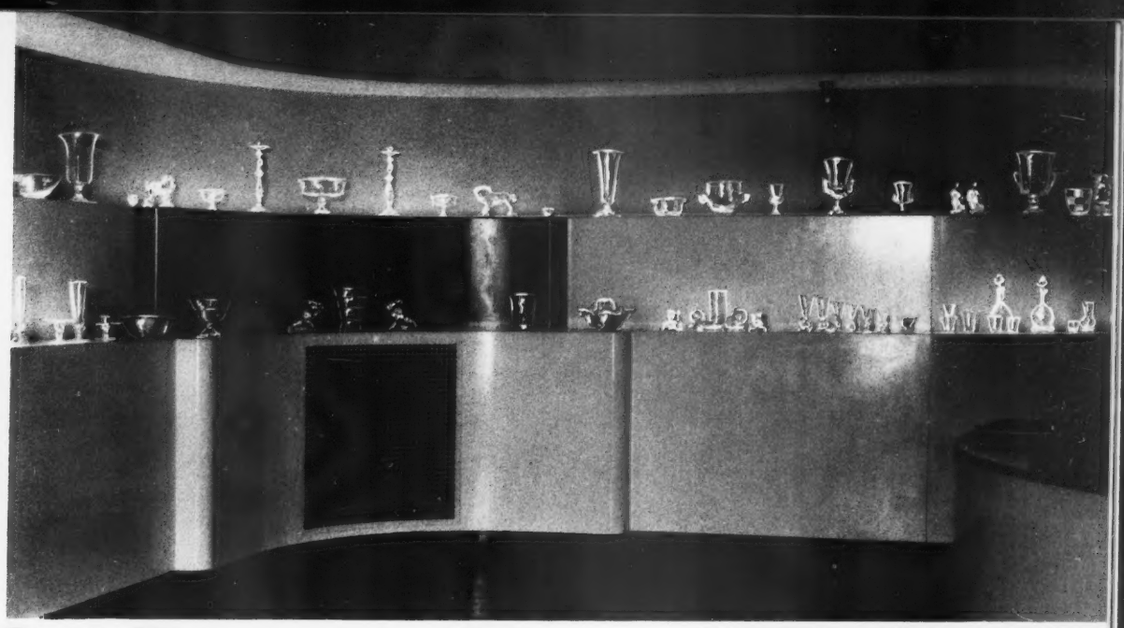


The two lehrs or annealing ovens viewed from the discharge end. A glance at the idle left-hand lehr shows the continuous screen conveyor which moves the ware through the annealing process, finally discharging directly to the wide belt conveyor in the immediate foreground

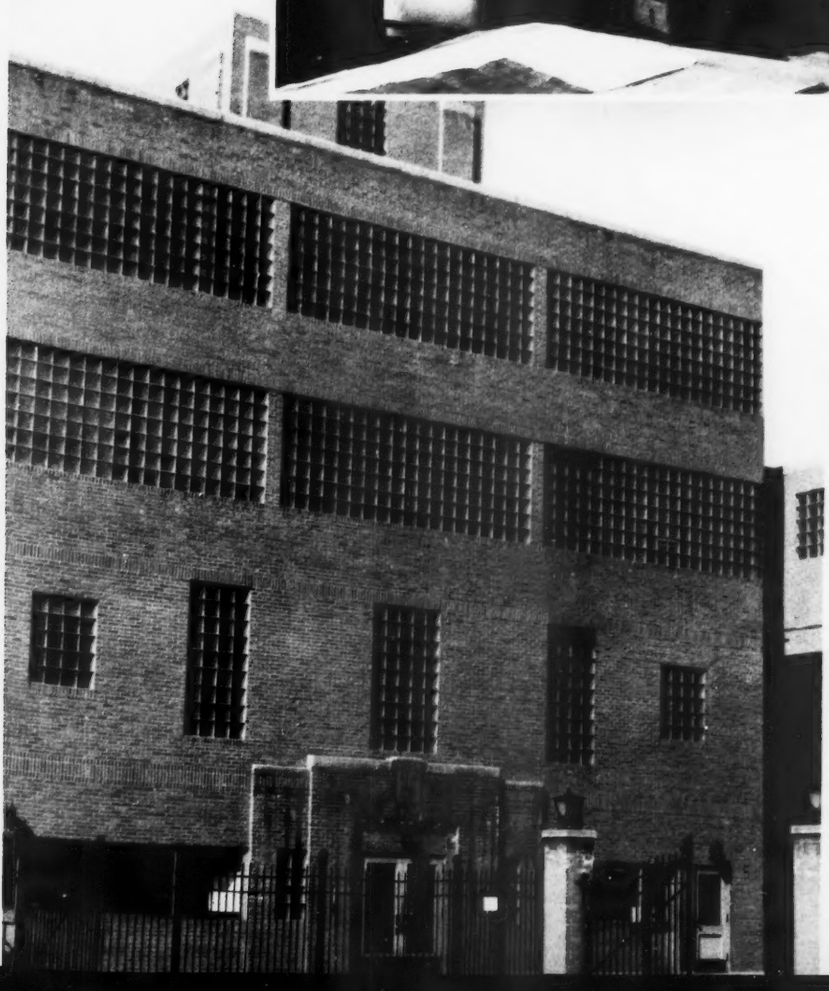
As ware leaves the lehrs it moves directly to the packers. From the packers, a power and gravity roller conveyor system takes the cartoned product away to the shipping platform. Steel sash provides good daylighting of sufficient intensities for the type of operations carried on here

Good natural lighting is found in the machine shop where the molds are made in which the Pyrex ware is pressed. Here an overhead rail system serves the various machines. Molds are moved to the machine shop and back to the production line via skid and power lift truck



Showroom in the Personnel Building for the display of Corning's beautiful hand-made Steuben ware. Ceilings in this building are of acoustical material. Its floors with a single exception are of asphalt tile

Research department's drafting room on fourth floor of the Personnel Building. Glass block in walls plus good artificial lighting provide all the foot-candles a draftsman would ever want on his work. Floor here is maple. Air-conditioning outlet is in ceiling



New all-welded Personnel Building is completely air conditioned, has glass wool insulated brick walls. Horizontal bands of glass block provide excellent natural daylighting of the non-glare variety, as well as insulation for air conditioning. Glass block is also used for interior soundproof partitions. The 4-story structure has a full-automatic passenger elevator. High fence and gates protect this main entrance to the works

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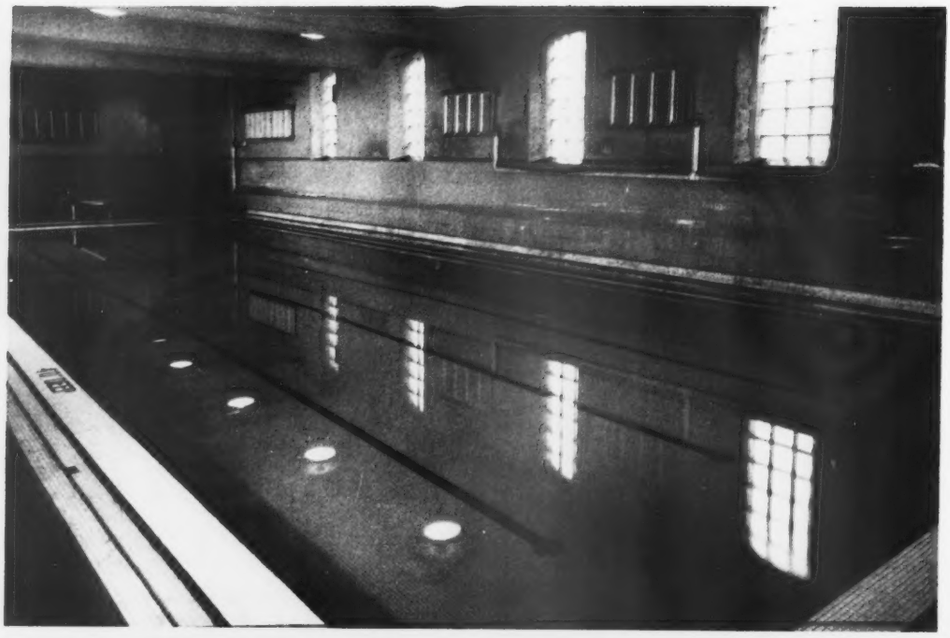
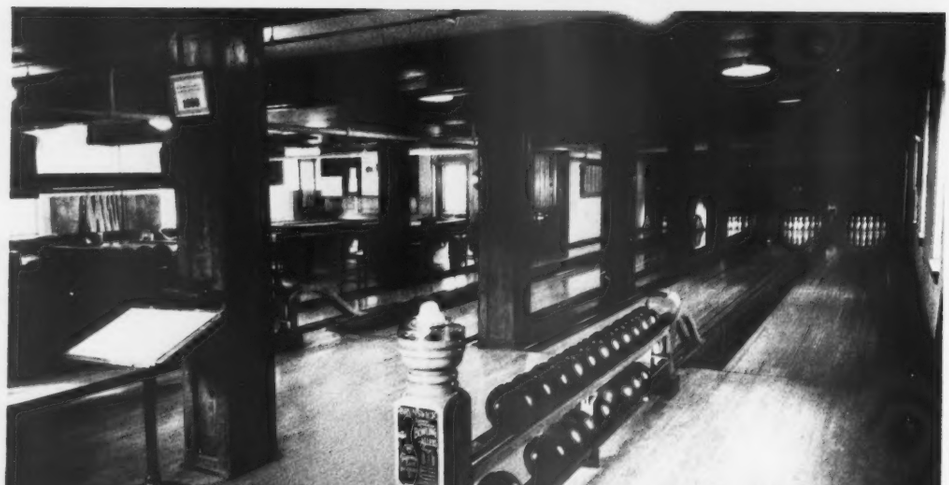
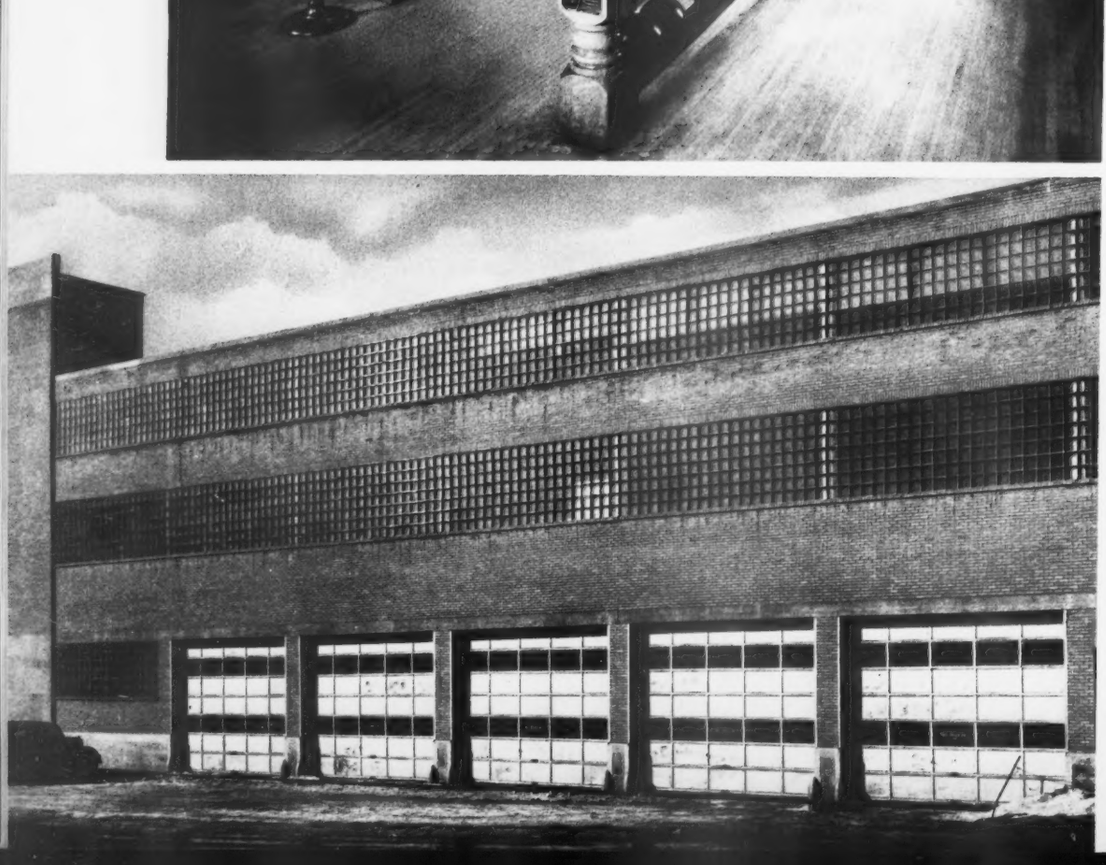




One might expect to find this popular swimming pool and these equally popular bowling alleys in the new Personnel Building. Only reason they're not is because Corning Glass built Memorial House, an employees' club house, some years back, and that is where these and other recreational facilities are still located



Loading end of new 3-story warehouse at Corning Glass Works. The five overhead doors to the dock are electrically operated. Down another side of the building runs a railroad siding and loading platform. This warehouse is of the extensible type. It can grow upward or laterally. The rear wall is of double corrugated iron with glass wool insulation and steel sash, a type of construction that lends itself economically to needed expansion. This is a comfortable warehouse to work in

BUILD THE PLANT AROUND THE PROCESS

Simonds Saw & Steel Company

FITCHBURG, MASS.

ENGINEERS AND BUILDERS
The Austin Company, Cleveland

TRADITION and previous practice were completely disregarded when plans were made, in 1930, for the new Simonds plant. There were no compelling reasons why such drastic measures had to be taken, other than those that confront every progressive concern. This company had a record of more than 100 years of successful operation. Its methods and processes were all in accordance with good practice.

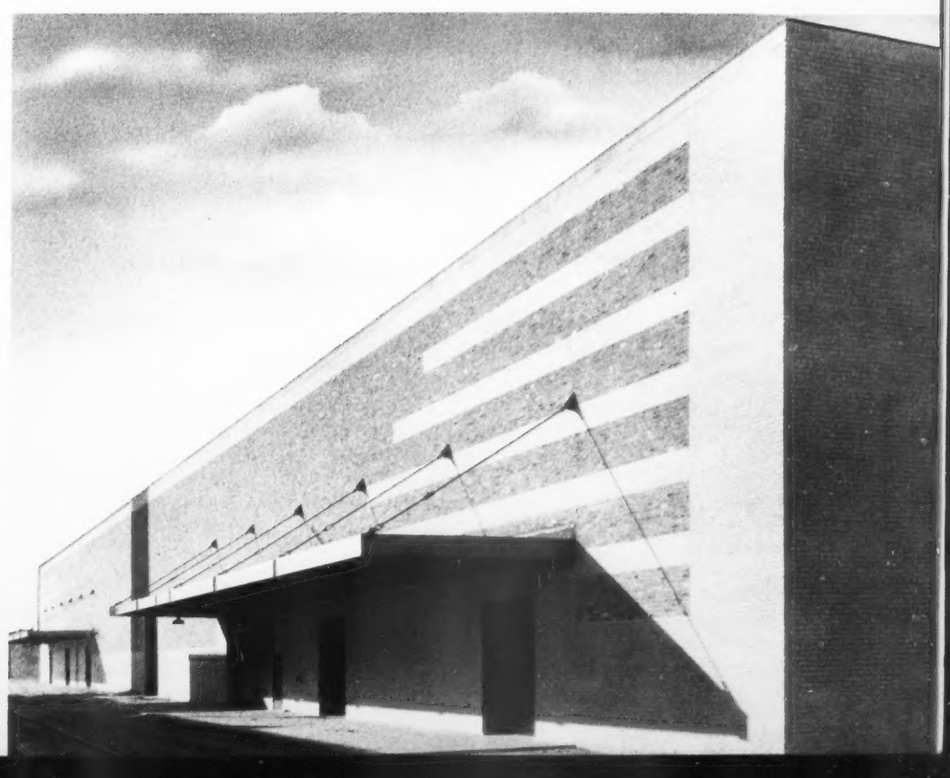
Need for more room, however, brought with it a determination to study manufacturing operations, both as a whole and in detail, in the most critical manner. Object, to design an ideal plant. Many months were spent in this preliminary work. Thousands upon thousands of dollars went into models and layouts. Every operation was analyzed; the functions of every employee and piece of equipment were studied.

In a striking example of cooperative planning, every workman in the plant, as well as every executive, was asked to tell what he thought the ideal plant should be like, and how it should be laid out. Many visits were made to the most modern plants in other industries. Ideas and suggestions were gathered from every source. When they had all been sifted and coordinated, there emerged the basic design of the new plant, which is now being completed after an interruption of several years.

It is in effect a single windowless room 562 feet long, 360 feet wide. This design was based on the straight-line production of a wide variety of wood and metal saws, planer and other types of knives, files, and similar products. Eight major production lines will run side by side nearly the entire length of the building. In each line will be installed all equipment, including heat-treating furnaces, required to turn out the product handled. In other words, all raw steel stock will come in at one end of the plant, emerge as finished product at the other, a few hundred feet away.

Effectiveness of the new layouts will enable this plant, containing a little less than 5 acres, to accommodate all operations heretofore carried on in two older plants having a total area of 17½ acres, with about an acre to spare.

The design utilizes the minimum number of columns, of which there are only 56. There are eight 70-ft. aisles with column supports every 40 feet. The 1,020 tons of structural



Buff-colored face brick and used common red brick were combined to give a striking and pleasing effect to walls that are unbroken by windows. Situated on a 53-acre plot, the plant contains approximately 5 acres of floor space. It is designed so that it may be enlarged on all four sides. Ample railroad and truck transportation facilities make the location ideal

The plant is essentially one big room. This view is looking toward one end, from about the center. Aisles are 70 feet wide. There are only eight columns lengthwise, and seven across the width. About half the piping required for gas, air, and other services is installed under the floor, along with special power duct which is spaced on 10-ft. centers and provided with an opening every 2 feet. Risers for some of these services can be seen in the section of concrete floor in the center foreground, which is being prepared for laying wood block. Supply lines, including power, are carried in the roof trusses and drop down at the columns

steel in the building was entirely shop welded.

Special design of the roof provides maximum soundproofing and insulation with minimum weight. The underside of the ceiling is formed of perforated metal of hollow rib design, into which cork slabs were fitted. On top there are two staggered layers of ½-in. insulating board, protected by a 15-year bonded waterproof covering. It is claimed that this construction will absorb 93 per cent of the sound reaching it.

The windowless outer walls are composed of buff-colored face brick and used common brick arranged in a striking design. On the interior the walls are lined all around with acoustic-type cinder block, a dead air space being left between the inner and outer surfaces.

Illumination is provided by a lighting system consisting of 1,440 units of a new type of tubular fluorescent lamp having an efficiency of 50 lumens per watt. Curved porcelain reflectors, each carrying a 100-watt lamp, are mounted 16 feet above the floor and give an intensity of 20 foot-candles or more.

The building is completely air conditioned by four large evaporative-type units separately housed in lean-to structures located near the four corners. Each unit has its own control panel containing a thermostat and humidity control. Air will be circulated at the rate of approximately 400,000 cubic feet per minute. Fresh air will be admitted through louvers in the end walls of the structures that house the units.

Water at 52 degrees Fahrenheit for cooling and adjusting the humidity will be provided by four deep-well pumps at the rate of about 1,000 gallons per minute. After passing through water sprays the air will be distributed through 3,000 lineal feet of ducts. At the fans these ducts measure 68x90 inches, whereas at the farthest outlets they run 20x26 inches.

Trapping Heat at the Source

Spent air will be exhausted through 42 ventilators located on the roof above furnaces and other heat-generating equipment. Sheet-metal aprons extending from the ceiling to the bottom chords of the roof trusses have been installed in areas where furnaces are located. Their function is to trap as much heat as possible at the source.

A steel walkway 4 feet wide and ¼ mile long encircles the center section of the plant. It is suspended from the roof trusses, with 11-ft., 6-in. clearance above the floor, and will make it possible to observe operations throughout any portion of the plant.

About 7½ miles of different kinds of pipe were required to carry water, gas, steam, and other services to the production equipment. Approximately half of this piping is installed under the floor; the remainder is carried in the roof trusses.

Hot gases from furnaces and like equipment will be drawn off from 63 different positions and discharged outside by three huge underground exhaust systems. These ducts are insulated with corrugated asbestos, and all metal in them is covered with a special asbestos cement.

Thirty individual dust-removal units will serve several times that number of machines through underfloor ducts which connect each unit with other machines in that area. After removal of the dust the air is filtered and recirculated.

To provide power service for the production equipment, about 17,000 feet of special duct was installed in the floor on 10-ft. centers, with an opening every 2 feet, throughout the plant. This duct system contains about 550 standard and special splice boxes. In addition, a total of nearly 11.5 miles of galvanized iron conduit and 30.5 miles of wire and cable were required for power and lighting systems.

A section of one of the special underfloor ducts, with a standard splice box and openings spaced at intervals of 2 feet. The conduits lead to a panelbox on the column. A dust removal unit will be mounted on the concrete block pit at the foot of the column

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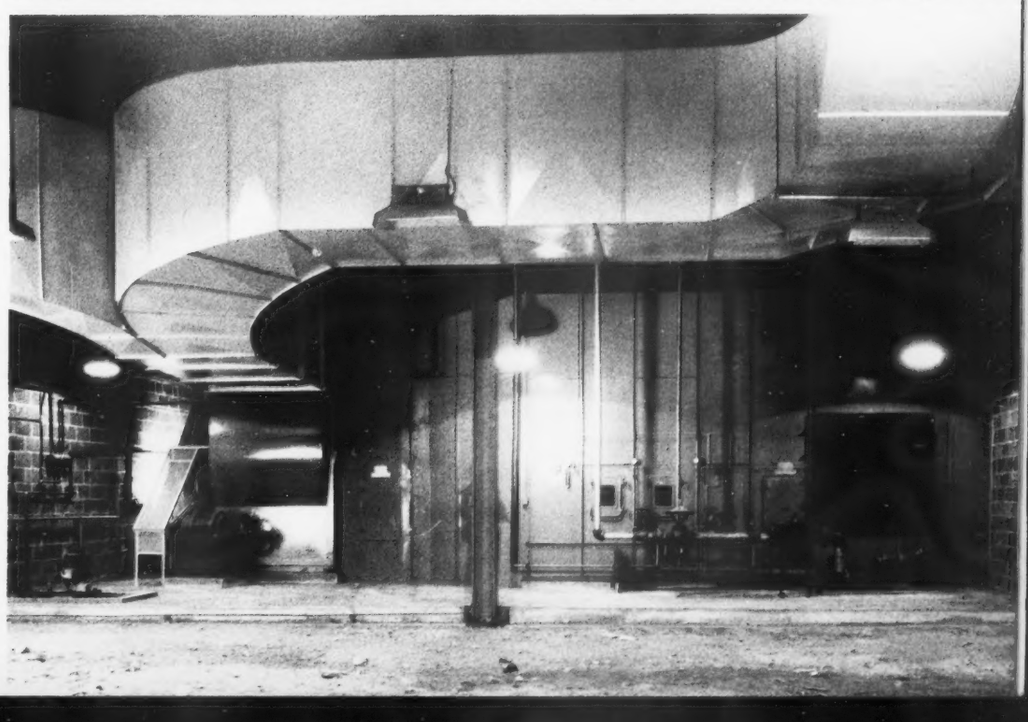
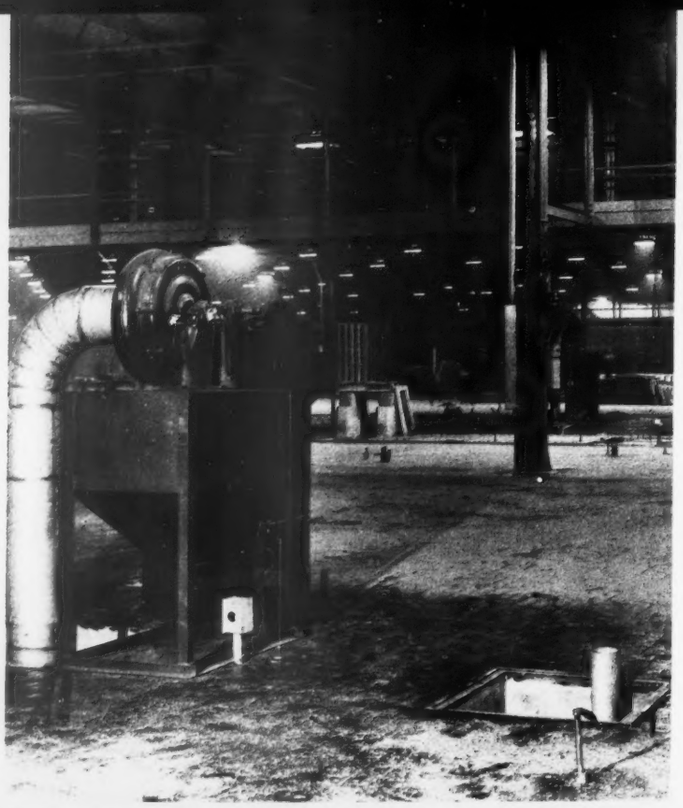
Ducts for the air conditioning system, upper left, are carried on the bottom chords of the roof trusses. This view looks across the plant, close to one end. At the upper right-hand side can be seen part of one of the sheet-metal aprons that serve to confine heated air rising from furnaces and facilitate its removal through the ventilators on the roof. Immediately below is a portion of the quarter-mile-long walkway from which operations in any part of the plant can be watched



One of the four evaporative-type air-conditioning units. These units are housed in lean-to structures 94 feet long, 28 feet wide, located a short distance from the corners of the building. Lockers and washrooms are also located in these structures. Cooling water for the air-conditioning units is obtained at a temperature of 52 degrees Fahrenheit from deep wells on the property. Each unit is controlled automatically from its own panel located on a column in the working areas. Together the units can handle 400,000 cubic feet of air a minute. Lighting units shown here will be replaced by another type that has recently been developed

Machines that produce dust will be connected by an underground duct to one of 30 individual dust-removal units, each of which will serve several machines. After removal of dust the air will be recirculated. Ducts are galvanized sheet iron inclosed in tile. Dimensions of the pits and length of the sections of galvanized duct have been coordinated to permit easy replacement



A separate ventilating system, automatically controlled, is provided for washrooms. It draws air from the interior of the plant through the rooms and discharges it outside. In this photographic view are shown the ventilating ducts leading from the men's toilet room on one side, and from the women's room on the other

Creosoted wood-block floors are used in the manufacturing areas. In certain other places the floors are concrete treated with a hardener. Factory offices will have floors composed of kiln-dried Douglas fir blocks set with the end grain up. These blocks are impregnated with a colorless preservative, instead of the material used for factory floors

Washrooms have light-colored tile wainscoting with black tile base and cap, and deep red tile floors. Ceilings and walls above the tile are hard white plaster. Lavatories have a soap container and pedal-controlled spray

BUILD THE PLANT AROUND THE PROCESS

Dodge Truck Division

OF CHRYSLER CORPORATION DETROIT

DESIGNER: Albert Kahn, Inc., Detroit
in cooperation with Chrysler Corp. engineers

LONG-RANGE PLANNING for tomorrow's needs, while meeting today's requirements, is well exemplified in this new plant. It was designed for the straight-line assembly of trucks, and layout of assembly operations is as nearly perfect as months of planning could make it.

Around this layout was erected the main building. It is a structure 1,260 feet long, 400 feet wide, occupying an area of 504,000 square feet, or 11.5 acres.

Materials and parts are delivered to the plant both by rail and by truck. An important detail of the layout is that incoming shipments are checked in and temporarily stored as close as feasible to the point where they enter the assembly lines. Therefore rail shipments are received on both the north and the south sides of the building. Truck deliveries are unloaded at one of three receiving platforms located in different parts of the plant.

From the unloading docks the parts are carried to their destination by conveyors, of which there are 21 overhead conveyors having an aggregate length of 3.1 miles and 29 others with a combined length of nearly 4 miles.

An assembly plant requires plenty of ground around it, both for possible expansion and to accommodate the steady stream of trucks rolling off the assembly lines, until they can be shipped or driven off by purchasers. Therefore a tract of land containing 136.5 acres was acquired on Eight Mile Road, on the northeast side of Detroit. A branch railroad line runs along the rear of the property, providing needed facilities for rail shipments.

The present plant, comprising the main building, export building, and power house, was put up at one end of the site, adjoining another industrial property. Together, buildings and storage space occupy approximately 49 acres.

The power house, which supplies steam only for building heating and process, was erected at one corner of the plot where it cannot interfere with any future plans for expansion of production facilities.

Occupying an area of 29,534

The new Dodge Truck Division plant was built at one end of a plot containing 136.5 acres. Buildings and yard for temporary storage of new trucks cover 49 acres. The export building can be seen about in the center of the storage area, at the right of the main building. Here trucks are taken down and crated for foreign shipment. At the upper right-hand corner are the power house and water tank for the sprinkler system. A branch railroad line passes by at the rear

The Detroit News

square feet (about two-thirds of an acre) the export building houses all activities involved in disassembling and crating trucks for shipment to foreign countries.

Of brick and reinforced concrete construction, the main building is a combination of 2-story and single-story design with monitor roof. At the front end it is two stories high, the engineering and certain other offices being located on the second floor. There are also two stories along one side. The painting department occupies the upper floor in this section. In order to avoid the use of supporting columns, the floors in these 2-story sections are suspended from the roof trusses.

These trusses are of bent-beam, welded construction with riveted field connections, and have a 60-ft. span. They are spaced at 40-ft. intervals, forming bays 60x40 feet.

Ceiling height is 16 feet in low bays, whereas in the high bays underneath the monitors it is 31 feet.

A covered court 40x1,260 feet, and 40 feet high from first floor to roof, extends the full length of the plant between the second-floor balconies, affording a maximum amount of sunlight and natural ventilation for the body assembly operations on the first floor and the body paint operations on the second floor. It also offers an excellent opportunity to convey stock between the two floors, and it is here that a large number of the monorail conveyors have been located.

The roof deck is composed of precast concrete slabs, with a 5-ply tar and gravel covering. Over the office the roof is insulated with a 1-in. layer of exploded mica.

5 Acres of Glass

Concrete floors 5 inches thick and hardened in aisle areas are used throughout the building. Engineering office floors are covered with linoleum; asphalt tile is used in offices located on the first floor.

Good light, and plenty of it, is essential for practically all the operations; ample provision was therefore made for meeting this requirement. Most of the area of side walls and monitors is glass, to permit maximum utilization of daylight. In the monitors alone there is 1 square foot of glass to each 4 square feet of floor space. Altogether there are more than 5 acres of glass.

A high quality of artificial illumination is provided in the working areas by approximately 1,500 450-watt high-intensity mercury-vapor-lamps in dome reflectors. These units are spaced on 20-ft. centers, with a minimum mounting height of 16 feet. For some operations where a high intensity is required, lighting units are mounted 9 feet above the working plane, spaced 8 to 12 feet apart. Where color discrimination is necessary, as in inspection and certain painting operations, combination units containing high-intensity mercury-vapor and other lamps are used.

Lighting in offices is fully indirect, provided by 500-watt lamps in aluminum reflectors mounted 11 feet above the floor on 14-ft. centers. With this arrangement an intensity of 18 foot-candles is obtained.

Approximately 130 ceiling-mounted unit heaters of the downward-discharge type are required for heating the working areas. These heaters range in rating from 50,000 to 500,000 B. t. u. an hour. They are supplied with steam at a pres-

At the front end and along one side, the main building is two stories high. Engineering and other offices are located on the second floor. The remainder is of single-story construction with monitor roof. It is built of brick and reinforced concrete, is 1,260 feet long, 400 feet wide, and covers an area of 11.5 acres. Designed as a "daylight" factory, the monitors and side walls contain more than 5 acres of glass. In the monitors alone there is 1 square foot of glass to each 4 square feet of floor space

Looking across the building, under one of the monitors. The bent beam roof trusses were shop-welded, only the field connections being riveted. Bays are 60 by 40 feet. In the monitor or high-bay sections the ceiling height is 31 feet. Lighting units are 450-watt high-intensity mercury-vapor lamps in dome reflectors. In the foreground is one of the large downward-discharge unit heaters. Most of these units are rated 500,000 B.t.u. per hour at 20 pounds pressure

sure of 20 pounds per square inch. Thermostats mounted on building columns in the working areas control operation of the heaters.

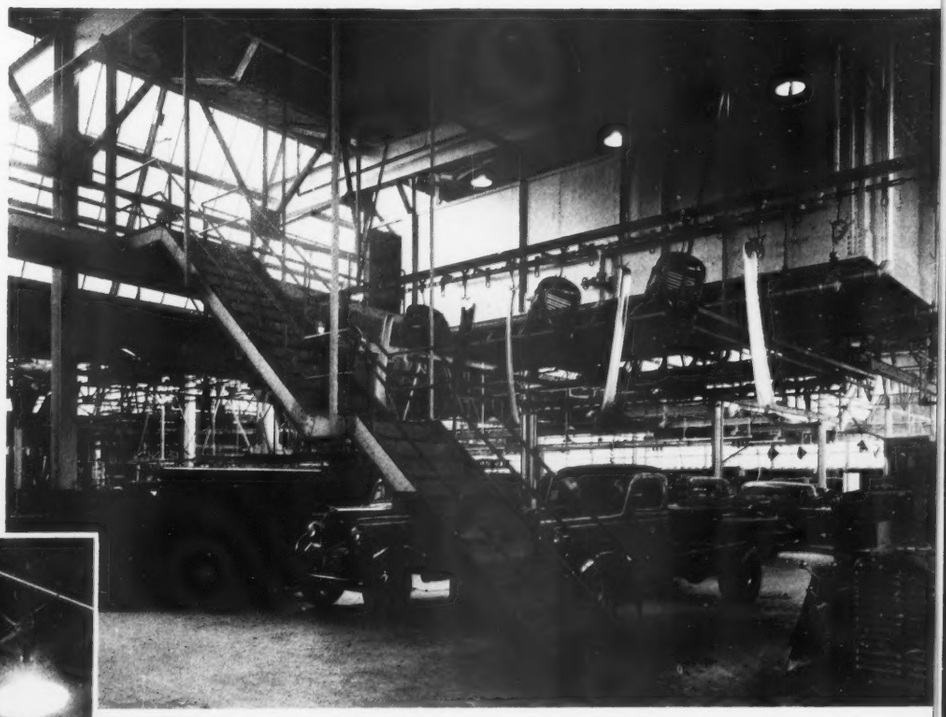
Inclosed offices are heated by cabinet-type hot water radiators with automatic controls.

The large open office area on the second floor is heated by filtered warm air forced through a duct system with outlets in the ceiling. Cold air is drawn off at the floor level, passed through filters, warmed and recirculated. Provision is made, of course, for discharging any desired proportion of the air outside and replacing it with fresh air.

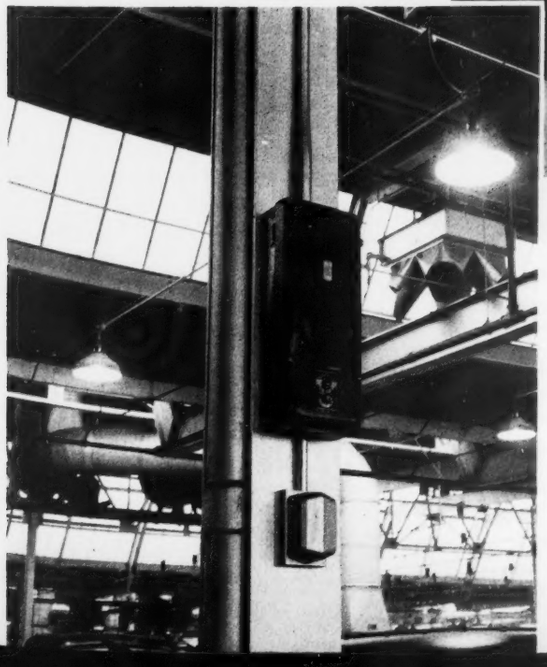
In order to save working space, the factory toilet rooms were suspended from the roof trusses in approximately the center of the building. There are four of these rooms, which serve both the first floor and the painting department on the second. Access from the first floor is by stairway; from the second by a catwalk. A drinking fountain is placed at the entrance to each catwalk and stairway.

Two substations required by the electrical distribution system are also suspended from roof trusses.

There are three unloading platforms, located in different parts of the plant, for parts delivered by truck. All materials and parts are delivered as close as feasible to the point where they will be used. This unloading platform is housed in an inclosure built out from a side wall of the main building. A monorail hoist running along the track at the right carries heavy parts from the trucks to temporary storage inside. The large roll-up door at the back is motor-driven. Entrance of cold air into the working areas is prevented by the blast of warm air delivered by the unit heater shown at the upper right



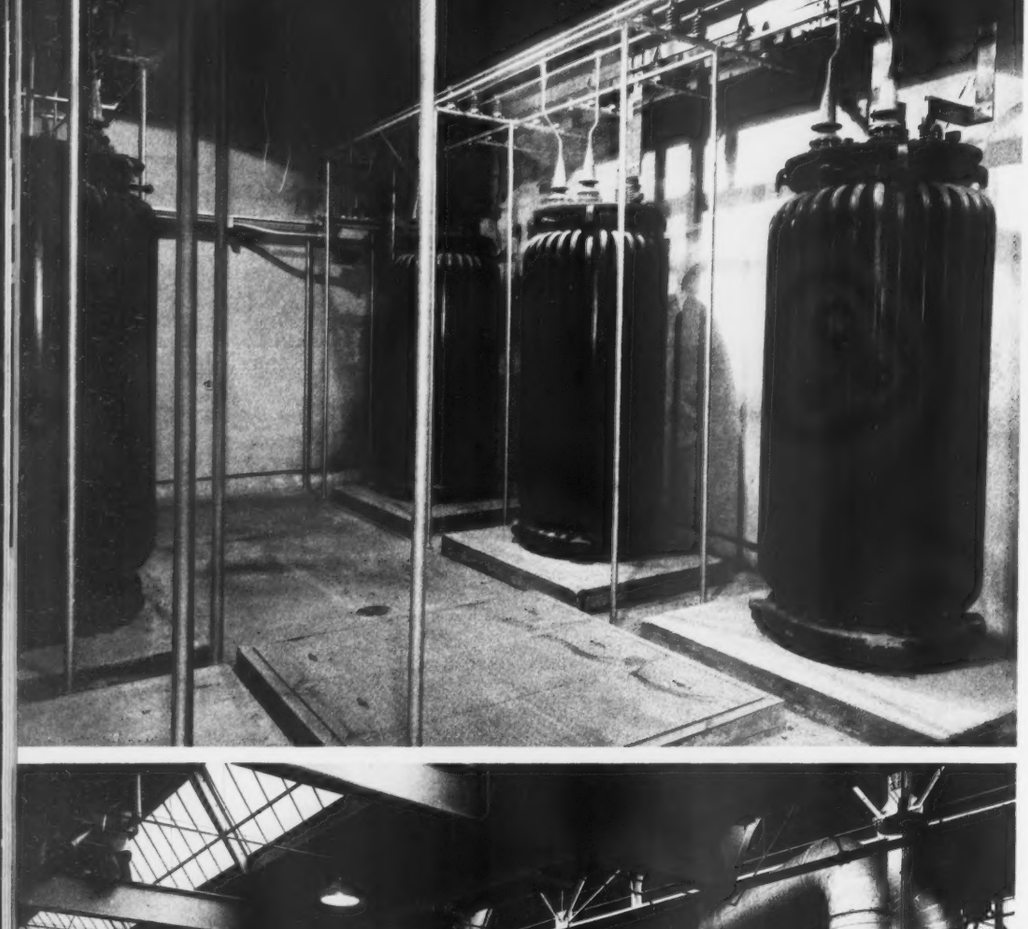
This is one of the four toilet rooms suspended from the roof trusses. Access from the first floor is by the stairway, and from the second floor (at the left) by a catwalk to which the stairs are connected. Two substations for the electrical system are also hung from the roof trusses. Running alongside this toilet room is one of the 21 overhead conveyors that serve the different departments and assembly lines



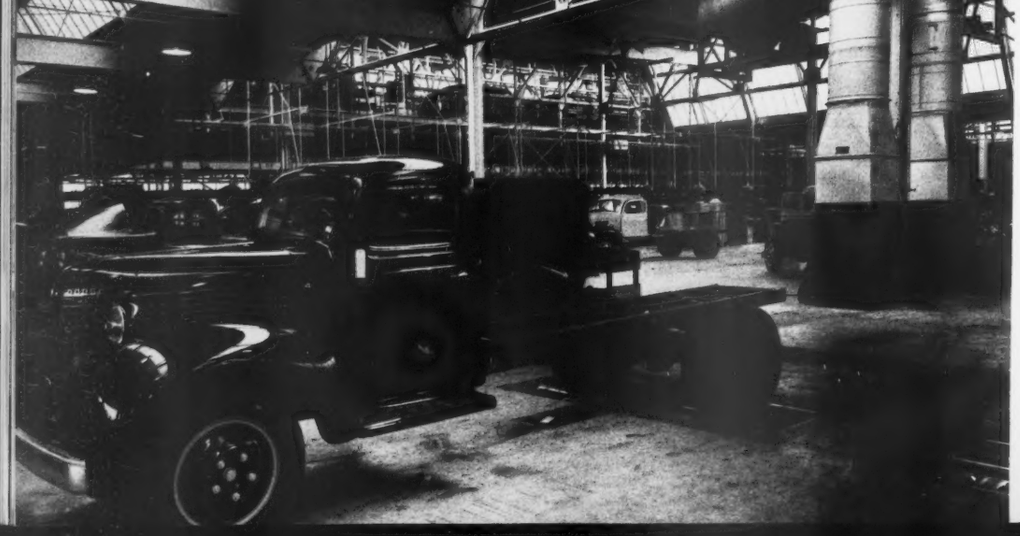
Operation of the unit heaters is controlled from panels like this. Under ordinary conditions the heater motor is started and stopped automatically by the thermostat mounted below the starter. If desired, the motor can be controlled manually by the knob in the starter housing. When the knob is in the center position the motor is disconnected. The reset button for the overload relay is just above the knob

Continued on next page

The office area on the second floor at the front of the building is heated by warm air discharged through 44 circular outlets in the ceiling. Cold air is drawn off through grills in the floor, is filtered, warmed, and recirculated, along with any desired proportion of fresh air. In the inclosed offices this system is supplemented by hot water radiators placed under the windows. Lighting units consist of aluminum reflectors with 500-watt lamps. Mounted on 14-ft. centers, 11 feet from the floor, these units give an intensity of 18 foot-candles at work levels

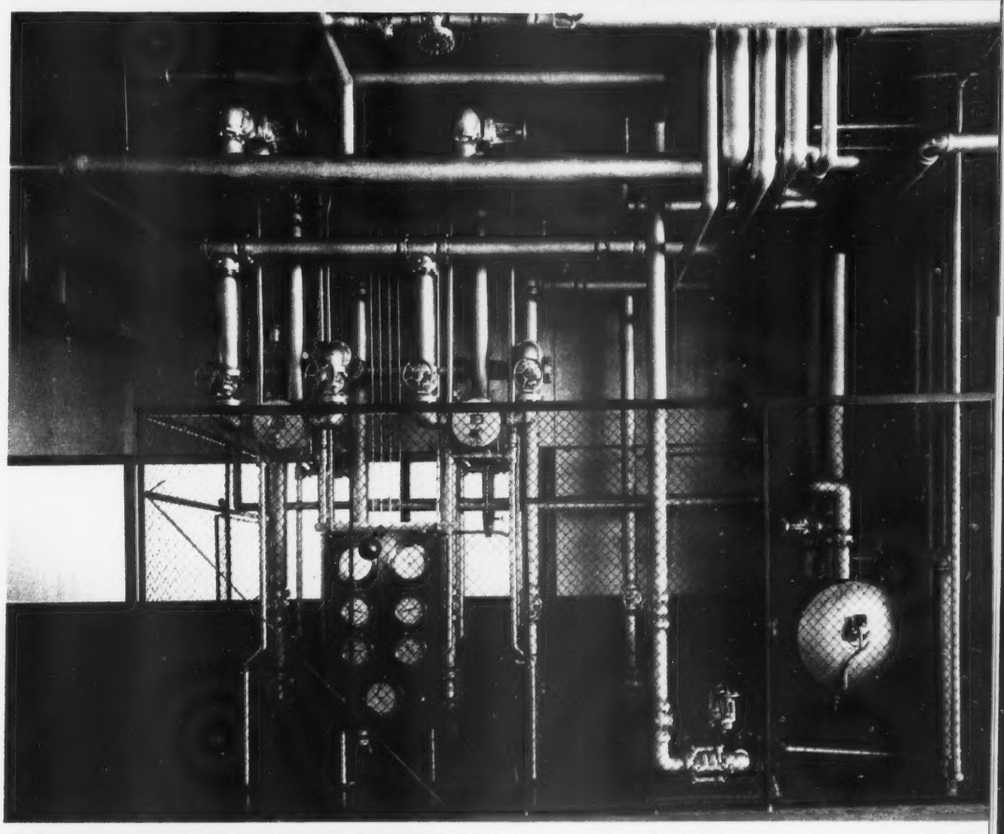


Up in the air and out of the way, these transformers are located in the smaller of the two substations suspended from the roof. They are rated 667 kva. each, and step down energy received at 4,600 volts, three-phase, to 440 volts for distribution through the plant. In the center is the opening, covered with floor plates, through which the transformers were delivered, and can be removed, with the aid of a hoist



As the trucks roll off the two final assembly lines under their own power, they are stopped with the rear wheels resting on two sets of large rollers, to permit final testing. Fumes are drawn through a grill and duct under the floor into exhausters shown at right, which discharge them outside

Trucks must be driven outside to yard storage as soon as they pass final inspection. To prevent chilling the plant in cold weather, they are driven into this inclosure built around the doors leading to the yard. The motor-operated doors of the inclosure are then shut before the outer doors of the building are opened



Hot water for heating the offices is heated by steam from the power house. The water circulates in a closed system consisting of the heat exchanger (at the right) and heating coils in a chamber, not shown here, to which the outgoing and return air ducts are connected. Admission of steam at 20 pounds pressure per square inch to the heat exchanger is automatically controlled by the temperature of the water. All condensate from it is returned to the power house. Hot water radiators in the inclosed offices are supplied by a separate circuit connected to the heat exchanger

Washrooms have rough-finished plaster walls and concrete floors. Ceiling, piping, and the upper part of the walls are finished with aluminum paint. Dadoes are dark gray. All washfountains are equipped with two paper towel holders and two soap dispensers. The adjoining spacious cloakrooms are of the same general construction and finish as the washrooms. They are equipped with metal racks and hangers for clothing

BUILD THE PLANT AROUND THE PROCESS

Johns-Manville Products C

ENGINEERS
Stone & Webster Engineering Corporation
Boston

CONTRACTORS
Consolidated Engineering Co., Baltimore

NO EXCEPTION to modern industry's practice of building its plants around its processes is the $1,500,000 Johns-Manville fiberboard products factory at Jarratt, Va.

Jarratt was chosen because of its proximity to plentiful supplies of Southern pine. A Southern location was sought because experiments in a pilot plant had proved that an insulating board superior to the present product could be made from this relatively inexpensive raw material. Also, Jarratt is on two main rail lines. The site is 2½ miles from the Nottoway River, from which the process water so essential to this type of industry is obtained.

Plant is laid out with an eye to the most economical handling of materials. Production flow is straight line all the way from the 5-acre raw materials storage area to the platform where finished goods are loaded into freight cars.

Plant consists of three main manufacturing buildings, all of them under one roof:

1. Pulp Preparation Building, 180x240 feet, and 30 feet clear under the roof trusses, with a machine bay 80x40 feet.

2. Drier Building, 520x44 feet, and 20 feet high.

3. Finishing and Storage Building, 480x240 feet, also 20 feet high.

In addition, a boiler house which generates process and heating steam. Also, between storage area and Pulp Preparation Building, a small Slasher Building where logs are cut to length. Adjacent to the latter, a barking drum. Sawdust and refuse from these two sources are conveyed to a hog fuel storage bin. Boilers burn either waste products or pulverized coal.

Single-Story Buildings

Manufacturing buildings are one-story steel frame, with 80-ft. span trusses (except in Drier Building) and spread footings of concrete resting on compact sand and clay.

Walls, concrete to floor height, with sill-high brick spandrels above. Siding, corrugated asbestos. Floors, concrete throughout. Steel roof trusses were completely shopwelded and assembled, thereby saving approximately 5 per cent on the total weight, or about 70 tons.

Roof designed to provide a minimum of dead weight and, at the same time, sufficient insulation to prevent excessive condensation from the moisture developed in the process. Flashings, copper.

This roof was constructed of corrugated sheets composed of asbestos and cement laid with butt joints and securely fastened to the purlins with galvanized clips. On top of this was laid a ¾-in. layer of insulating material. The surface was then covered with a 4-ply, 20-year roof.

Because the buildings were so long, expansion joints were provided approximately 250 feet apart. Joints in the superstructure were built up of overlapping stainless plates, designed to provide double contact for weather tightness and of spring quality to insure permanent contact of the exposed surfaces.

Through the brick and concrete walls a continuous joint was constructed of cork. This material has the faculty of expanding by absorption of atmospheric moisture up to an increase of 30 per cent over its original thickness. Thus the cork increases in width and fills the joint

Jarratt was chosen as the site of the new Johns-Manville fiberboard plant because of its nearness to plentiful supplies of Southern pine. This view from across the tracks shows conveying equipment that moves logs through the Slasher Building and barking drum, the boiler house, the Pulp Preparation Building, and (far right) the Finishing and Storage Building

Corporation

JARRATT, VA.

as the building shrinks. Or, should the building expand, the cork is compressible.

This same material was used for joints in the concrete floor slabs.

A storage platform adjacent to the railroad siding runs the entire length of the Finishing and Storage Building, is wide enough so that carload or truckload shipments may be assembled near the building wall and still allow sufficient space for trucking to and from the carrier.

Platform is of concrete at car-floor height, is protected by a cantilever canopy which is a continuation of the building trusses. This canopy extends to the far side of the railroad track, has a vertical apron which protects the loading operation from the weather.

The plant will produce some 100,000,000 square feet of fiberboard products per year, and will provide permanent employment for from 200 to 300 men, in addition to those employed in the cutting and delivering of pulp wood to the plant, most of which material is now to be purchased locally. To insure a permanent supply of raw materials, the corporation has purchased timber lands near the plant.

Looking down the 480-ft. loading platform. Of cantilever construction, it has a vertical apron designed to provide protection from the weather; with freight cars in place, the platform is, in effect, totally inclosed. Also wide enough so that loads can be temporarily stored close to the wall without interfering with trucking to and from cars. On the wall, one of several sprinkler alarms

From the roof of the Pulp Preparation Building. Shows the U-shaped layout of the three main buildings. At the left, the long, narrow structure that houses the 8-deck continuous drier. Across the yard, the Finishing and Storage Building, showing ventilating equipment and cantilever canopy over loading platform

Also taken from across the railroad siding, but from the other end. Monopolizing most of the room is the Finishing and Storage Building with its long loading platform. This building and the adjoining Drier Building (see photograph just above) are so long (1,000 feet) that expansion joints had to be provided. Far left, Pulp Preparation Building and boiler house

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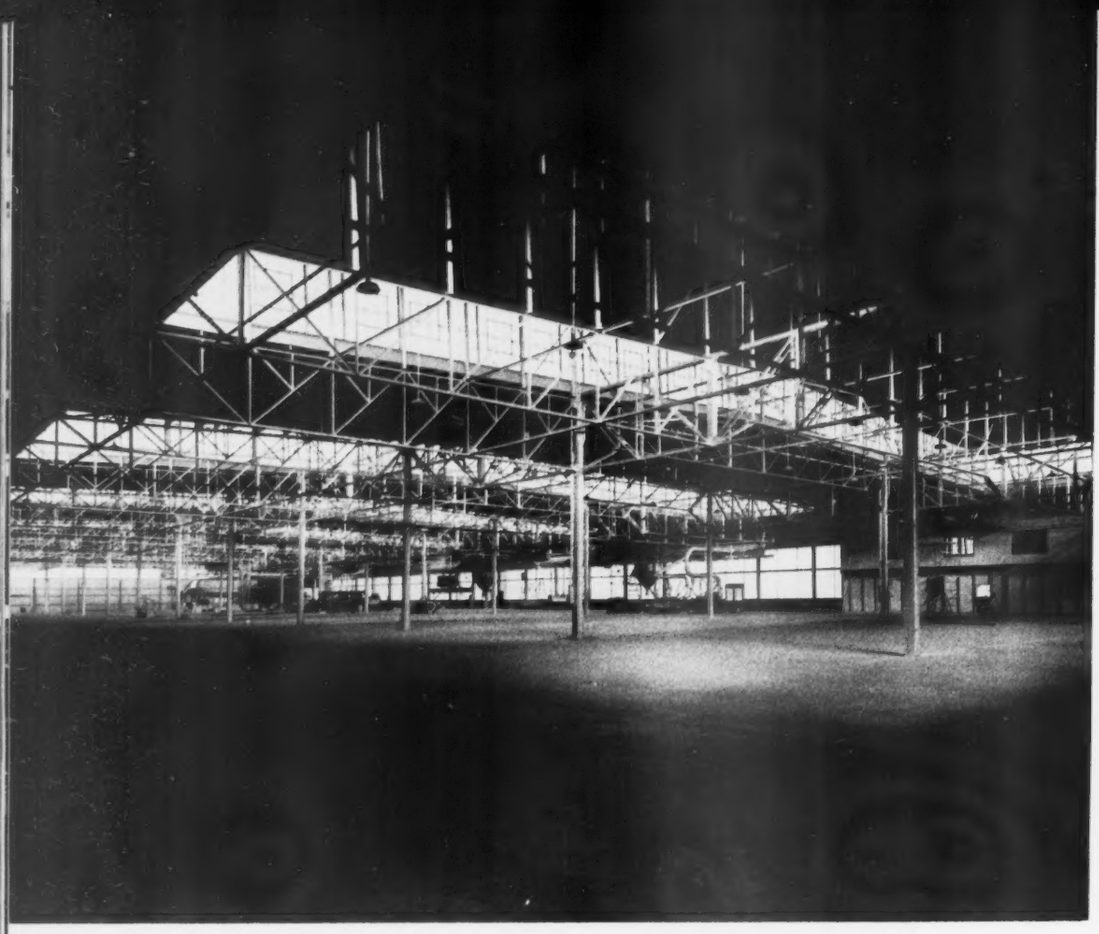
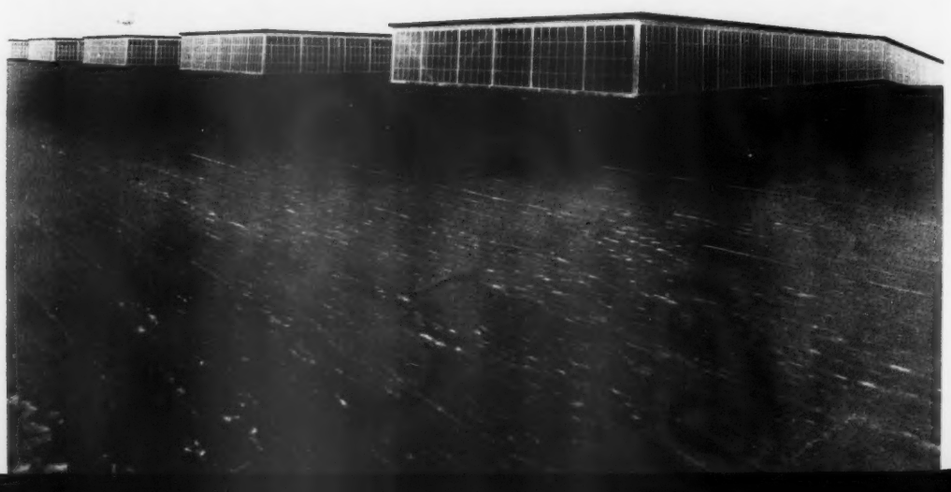
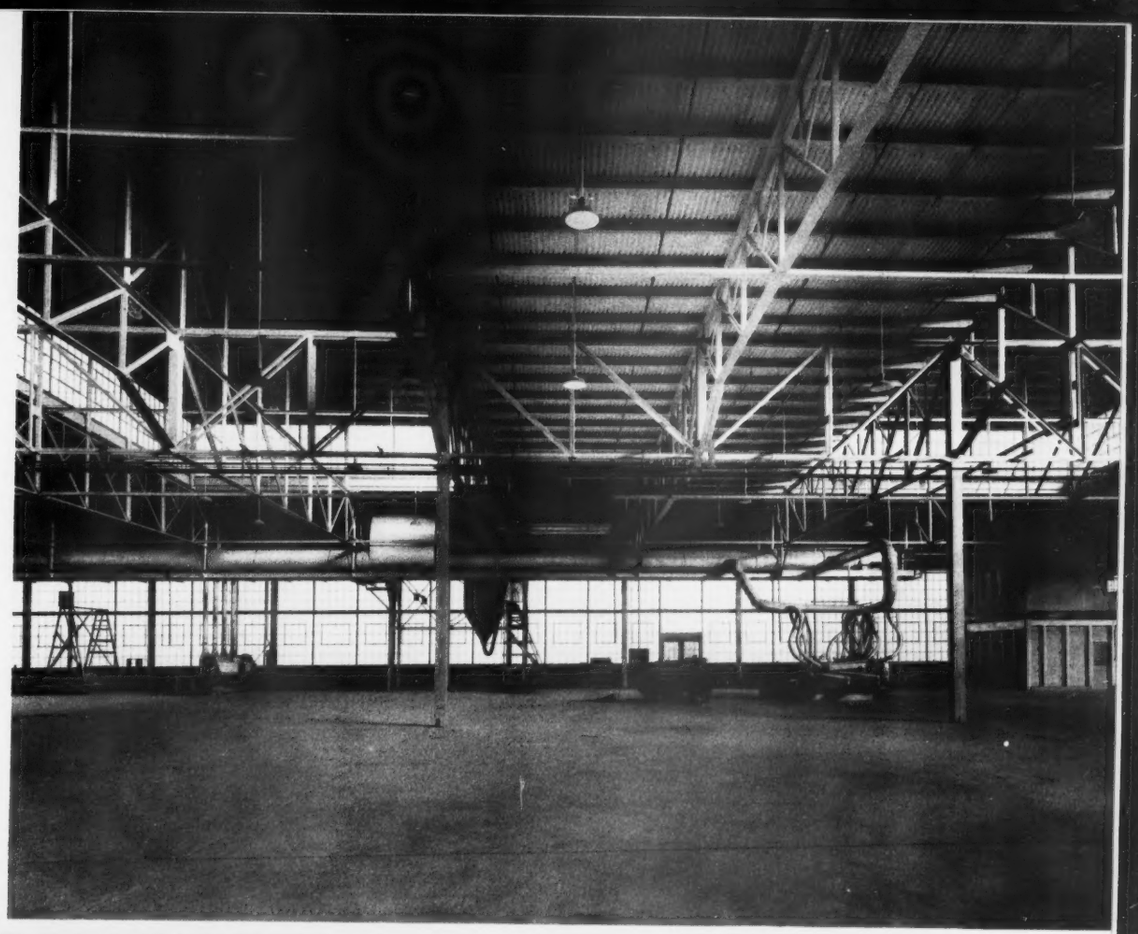


Interior of Finishing and Storage Building. Storage area in foreground, finishing section in background. Roof trusses were shop welded and assembled, with a saving in total weight of 70 tons. Unit heaters will keep this large room (480x240 feet) at comfortable working temperatures. At extreme right, the plant offices

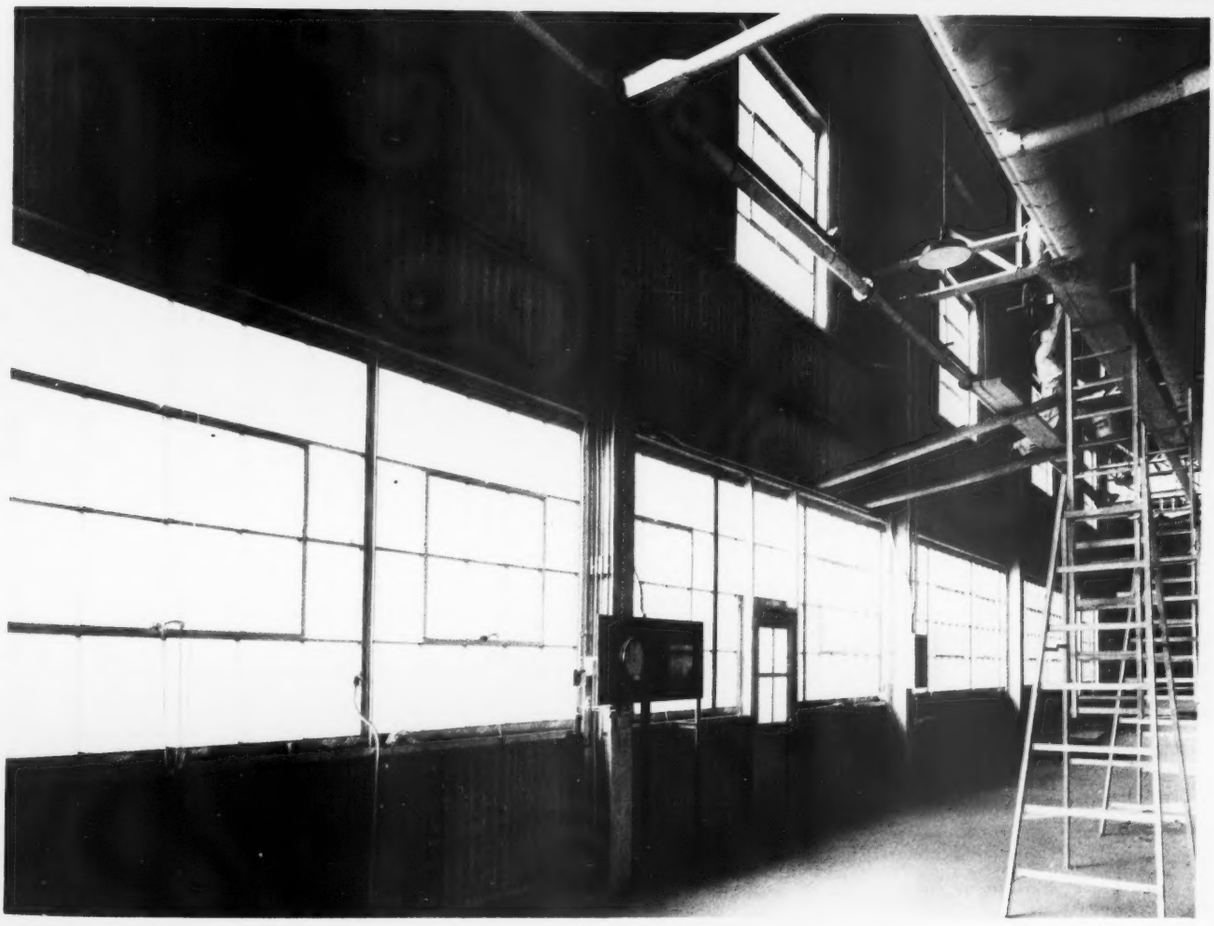
Looking toward the 5-acre storage area. It is served by a portable belt conveyer. Just beyond the roof is the conveying system that moves logs through the slashing and de-barking processes. Running at right angles to the main flow is the conveyor that carries waste to the hog fuel storage bin located beside the boiler house



On the roof of the Finishing and Storage Building. The roof has a 4-ply, 20-year, built-up surface laid on ¾-in. insulation material, which in turn is securely bolted to corrugated sheets of asbestos and cement composition. This photograph serves also to illustrate the monitor construction that was used



Looking across to the section where saws, mills, and other finishing machinery were being installed. Full glass walls on this side of the building provide excellent daylighting for finishing operations. This natural lighting is supplemented by 500-watt lamps in RLM domes, on 20-ft. centers, 20 feet high. In the center, one of the unit heaters; behind it, part of the ventilating system



Section of side wall in the Drier Building, showing corrugated asbestos siding and steel sash construction. All photographs were taken shortly before the plant went into operation, which explains the men who are putting the finishing touches on the piping insulation

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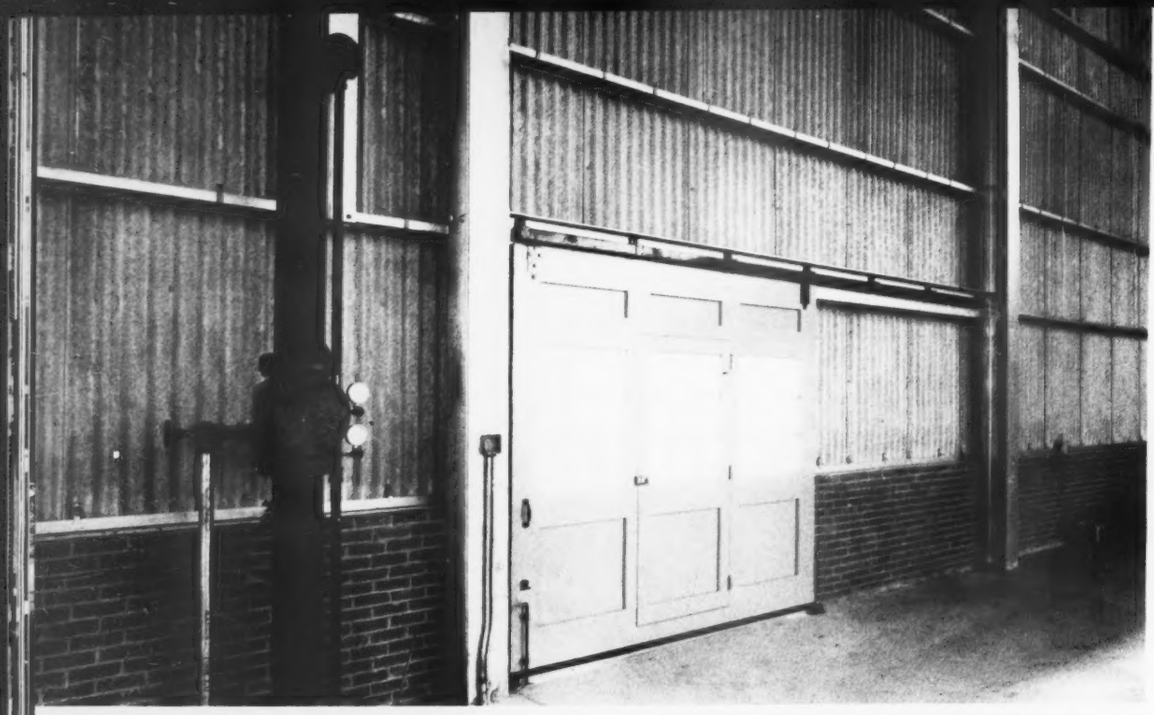
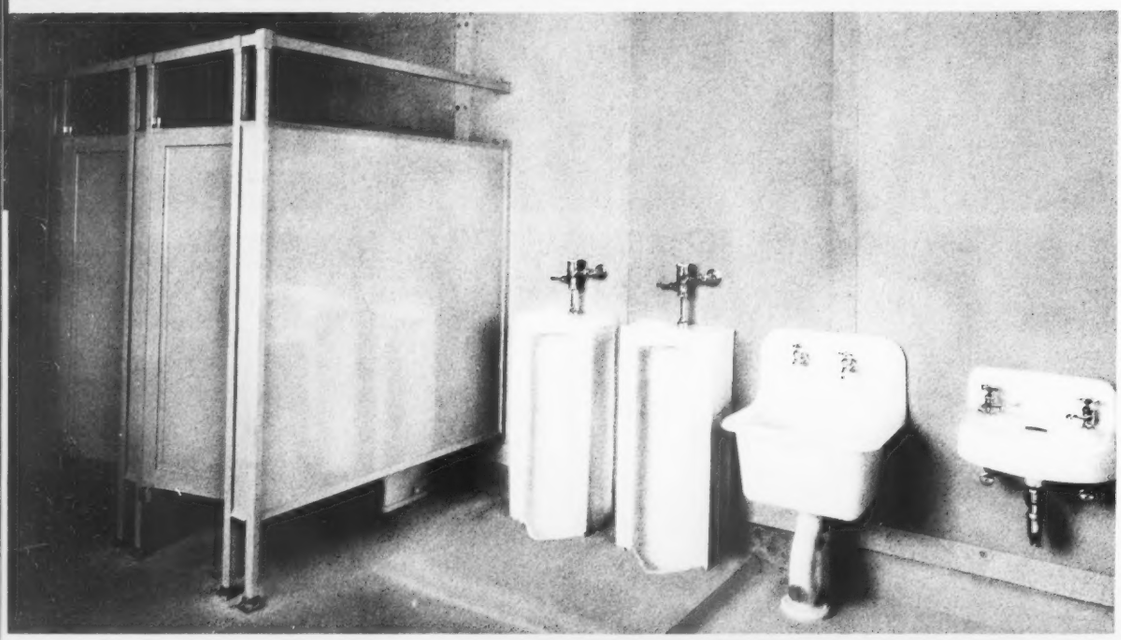


Wall on storage side of Finishing and Storage Building needs no windows, is brick to sill height, corrugated asbestos the rest of the way. Here, one of eight sliding doors to loading platform, with a section of sprinkler supply system. Aluminum paint is used throughout



One of five toilet rooms located at convenient points in the three main manufacturing buildings. Partitions here as in the plant offices are fiberboard

Five-compartment shower bath, and wash fountain in one of the washrooms. Drinking fountain provides plenty of water at cool, palatable temperatures

Bring Your Buildings Up to Date

If you can't build a new plant, why not go after lower production costs by bringing the old one up to date?

The Answers to These 20 Questions Will Help You Decide What to Do

1. Do foundations need attention?
2. Do walls show evidence of cracking or leaking?
3. Are windows in good condition?
4. Should doors be repaired or replaced?
5. Do roof decks and coverings need attention or replacement?
6. Are floors and floor coverings in need of repair?
7. Are stairways ample and safe?
8. Do any surfaces require painting?
9. Is the lighting system adequate?
10. Is the heating system effective and economical?
11. Will air conditioning improve products or working conditions?
12. Is there adequate provision for dust and fume removal?
13. Are sanitary facilities up to date?
14. Is the electrical distribution system adequate and flexible?
15. Are changes in type or location of power drives advisable?
16. Is the most effective use made of materials handling equipment?
17. Are there adequate communication facilities?
18. Are firefighting equipment and alarm systems in good order?
19. Are yard structures in good condition?
20. Do yards look attractive and well kept? Are they free from hazards?

A NEW PLANT that has been carefully designed to fit the production processes and includes the latest ideas in building construction possesses many features that have a definite dollars-and-cents value. Some of these features have a direct bearing on production or operating costs; others are designed primarily for the comfort and efficiency of employees which, of course, are ultimately reflected in lower production costs. Most of these features can be incorporated, and will be genuinely effective, in existing plant buildings.

Familiarity tends to make one blind to the shortcomings of his own plant. Things are accepted because they have always been that way. Therefore, the executives of plants housed in older buildings can profitably spend some time in becoming thoroughly familiar with the various features of plants that are modern in fact as well as in name. Study of the preceding pages will show some of the features of design and construction that characterize outstanding new plants, and why they were adopted.

Spend a few days visiting modern, low-production-cost plants. Then come back to your plant and go over it with the critical eyes of a prospective purchaser or appraiser. Chances are that many heretofore unrecognized opportunities for betterment will clamor for attention.

An effective program designed to bring an old plant up to modern standards involves at least two steps:

1. Study of the layout to determine how it can be improved.

Before a new plant is designed it is good practice to make an ideal layout, placing machines and arranging the flow of production for maximum efficiency. If conditions make it necessary to alter the layout, the changes can be made intelligently and with minimum interference with the basic plans.

This procedure will be just about as effective when one is dealing with an old plant. When it is once established what the layout ought to be for maximum efficiency, the extent to which the ideal can be realized, and

the structural changes that will be necessary, can be visualized clearly.

2. Determination of the changes that should be made, or work done to (a) increase operating efficiency or raise quality of product; (b) give better working conditions; (c) improve the appearance; (d) protect the plant buildings against deterioration.

These items can be determined only by a thoroughgoing and critical inspection of the entire plant. Note any condition that needs attention, even though it may not appear to be important. It is a good idea to indicate after each item the degree of importance or urgency. This procedure will insure recognition of all work which for any reason should be done at once, whereas less urgent matters can be handled in their turn, in a coordinated program.

Cost considerations will necessarily influence many decisions. It will frequently be helpful, however, to consider not only the cost of making certain changes or improvements, but also the cost or penalty of *not* making them. Such costs are obviously not so easily expressed in dollars and cents, but the fact that they are often more or less intangible increases the importance of considering them carefully.

Items that should receive particular attention are indicated in the following questions, which will be useful as a guide when making a plant survey:

1

Do foundations need attention?

Settlement may have caused cracks, which should be filled. Excessive settlement may be due to washing out of soil under footings, and necessitate strengthening.

If basement walls and floors are extremely damp, drainage may be inadequate. Several materials are available for application to interior surfaces of walls that will help to keep them dry. In severe cases it may be necessary to dig a trench around the building and waterproof the foundation by applying a membrane swabbed on with a suitable bituminous compound.

2

Do walls show evidence of cracking or leaking?

Cracks are of two types—(*a*) those due to settlement, vibration, or expansion and contraction; (*b*) those caused by shrinkage. The former must be cut out and filled with an elastic calking compound.

Shrinkage cracks should be cleaned out and filled with a cement-mortar mixture. Apply the same treatment to defective mortar joints.

For new work, or where extensive rebuilding of masonry is required, it is claimed that shrinkage of mortar can be reduced 50 per cent and bond breakage prevented by mixing certain proprietary compounds with the mortar.

Parapet walls, coping stones, ornaments, window heads and sills, must be given particular attention.

Walls that tend to absorb unusual amounts of moisture often require water-proofing. A number of prepared mixtures are available for this purpose.

3

Are windows in good condition?

In time, particularly when neglected, wooden sash tends to warp and crack. As a result it becomes unsightly, may waste heat by permitting the entrance of cold air, and permit moisture to get into walls. If old sash is in bad condition, consider the advisability of replacing it with the metal type. It can be had in a variety of standard sizes, with any desired arrangement for ventilation. Use of glass block also offers several advantages. Among them are lower maintenance, well-diffused light, comparatively high insulating value.

With any type of sash it is important to see that it is properly calked all around.

Heat and glare from sunlight often make working conditions very uncomfortable, and are objectionable all around. To meet this problem, glass has been put on the market that is said to absorb about 56 per cent of the total solar energy. It will transmit 75 per cent of the visible light, but less than 28 per cent of the infra red rays. Tests have shown a decided lowering of temperature in areas glazed with this material.

4

Should doors be repaired or replaced?

Entrances and doors have much influence on the appearance of a plant. Cost of one or more new entrances with doors of modern design may be small compared to the improvement in the appearance.

Inside factory doors often receive hard usage and should be kept in good repair, or replaced by a more suitable type when necessary. When fire doors are required, make sure that they are of approved quality and that automatic operating devices are in good condition.

Consider the advisability of enlarging door openings, also the use of rolling doors, to expedite handling of materials and save space.

5

Do roof decks and coverings need attention?

Examine built-up coverings for cracks, bulges, leaks, and other defects; and other types for defects peculiar to their kind. It is advisable to replace a covering that has reached the point where it requires frequent patching.

Leaks and other troubles frequently start around flashings; hence they should be inspected with care. Design of recently developed flashings of copper, aluminum, and other materials offers important advantages.

Monitors and skylights should be carefully inspected.

Leaks and condensation sometimes cause extensive rotting of wooden roof decks in old buildings. Need for additional insulation to reduce heat loss and condensation may also make it advisable or necessary to install a new deck. Several types are

(Continued on page B-92)

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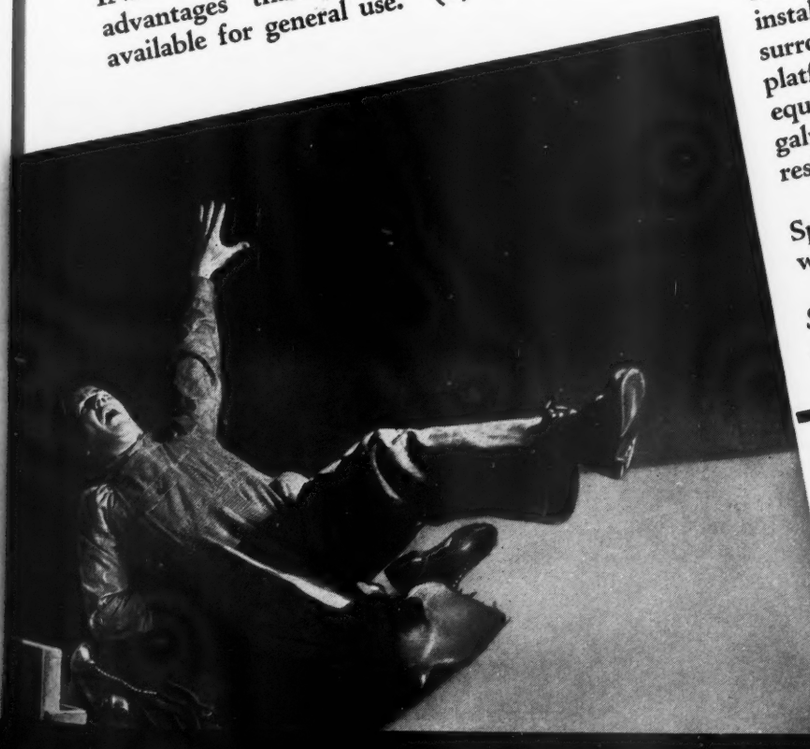

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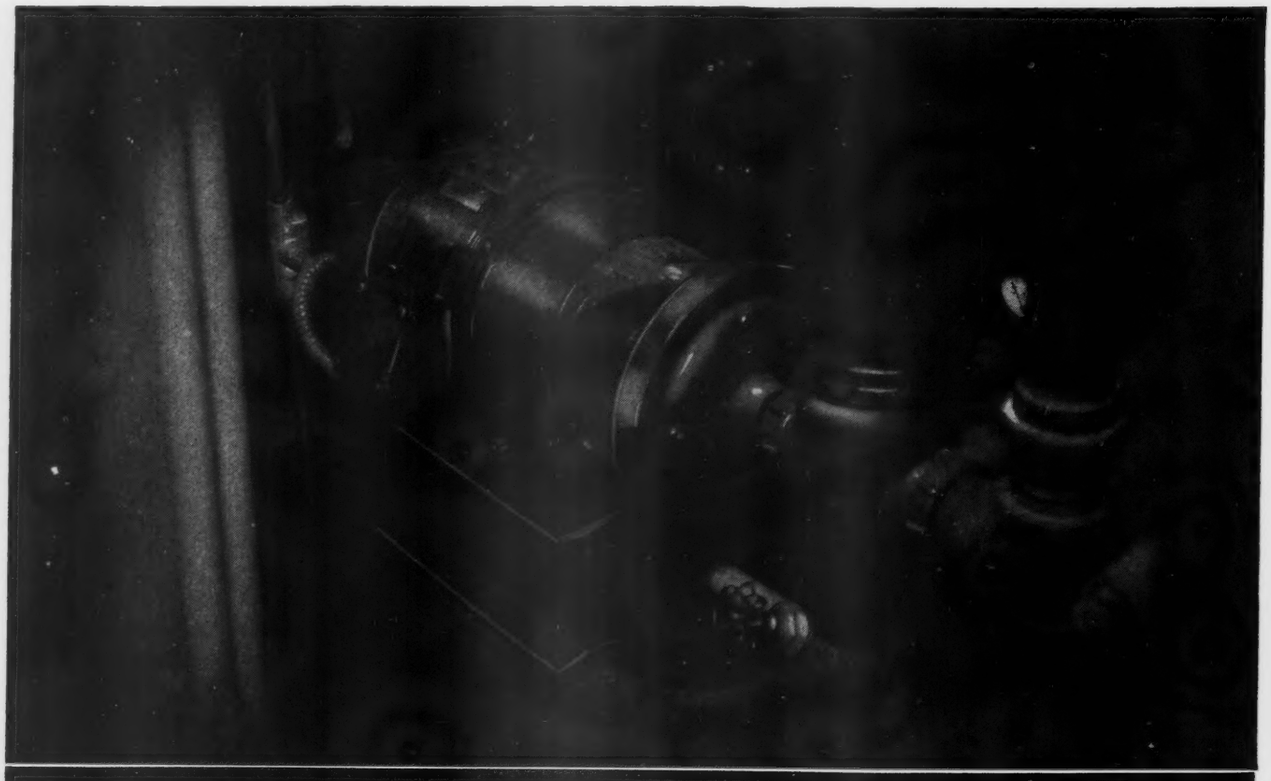

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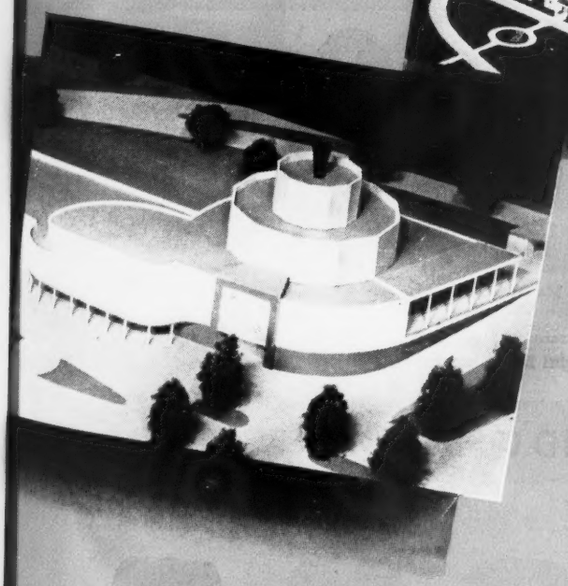

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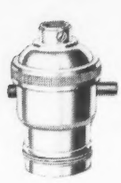
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3707

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Box Mounting—Metal Cover, All Porcelain, and Bakelite Cover Lampholders
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5103

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Flush, Surface and Box Mounting Connectors
Weatherproof Connectors
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INDUSTRIAL SWITCHES

2387

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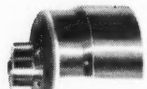
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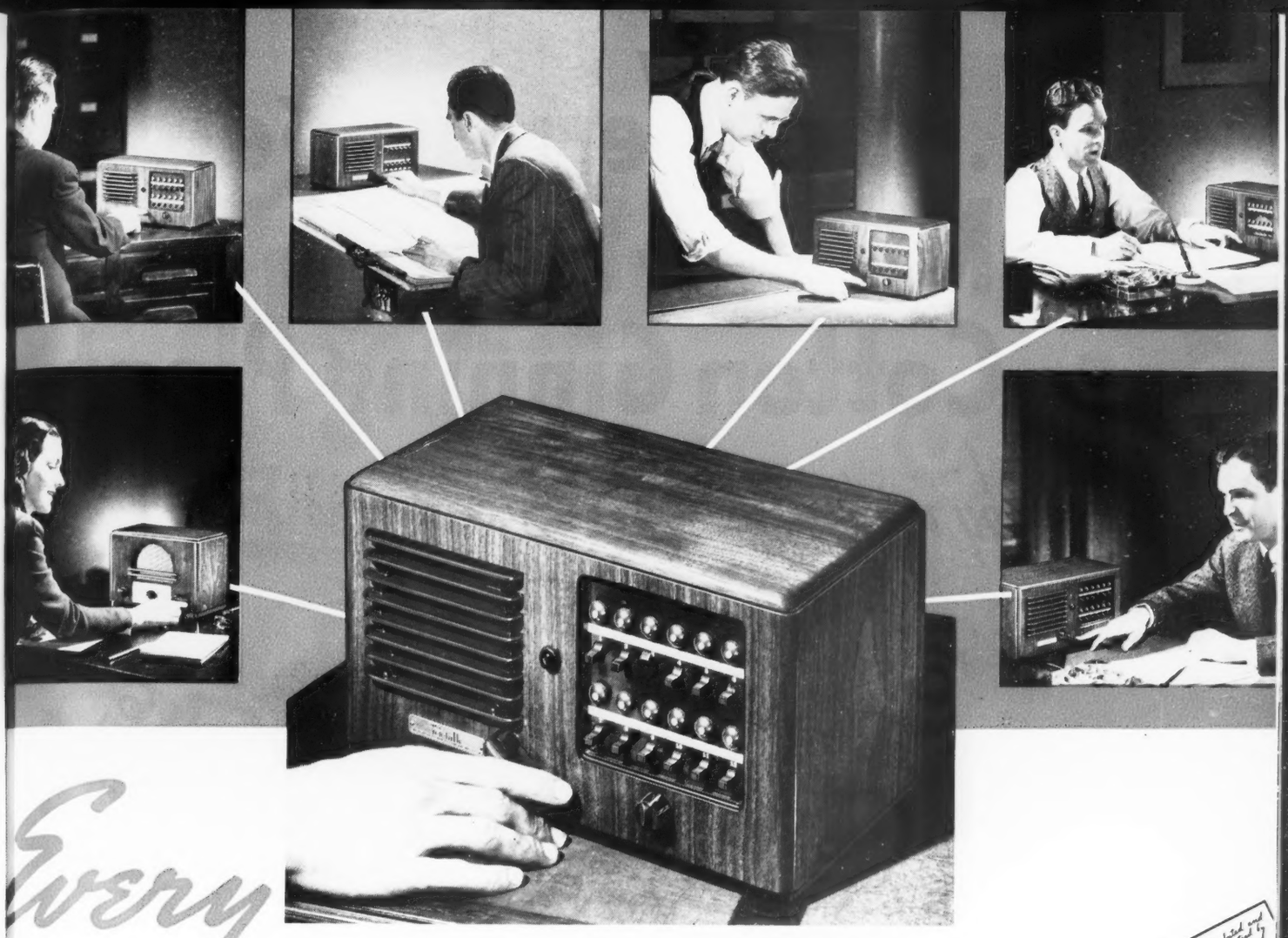
IN 1939 GRAYBAR



Every

phase of Factory Control
is at your finger-tips with

WEBSTER ELECTRIC
Teletalk
REG. U.S. PAT. OFFICE

Distributed and guaranteed by GraybaR

● Good factory management—the coordination of all phases of engineering, production, and maintenance—is more dependent upon saving time, words and steps than any other single factor.

Now, "split-second" inter-communication between plant departments and individuals, which effects these savings as well as money savings, is available for the first time, at a cost within the average budget.

Webster Electric Teletalk is the new, modern, efficient, low cost means of factory inter-communication. Systems ranging from two stations to an unlimited number can be provided. Five basic models with Speaker-Microphones for unimportant stations and larger, high-powered Speaker-Microphones for areas where a high noise level exists, make possible both centralized or decentralized systems.

Write for complete information regarding the application of Teletalk to your plant, typical systems, how and by whom Teletalk is now being used.

Licensed by Electrical Research Products, Inc. under U.S. Patents of American Telephone and Telegraph Company and Western Electric Company, Incorporated

WEBSTER ELECTRIC COMPANY, RACINE, WISCONSIN, U. S. A.
Export Dept.: 100 Varick St., New York
Cable Address: "ARLAB," New York

REPRESENTATIVES AND DISTRIBUTORS LOCATED TO RENDER 24-HOUR SERVICE

Webster Electric

"Where Quality is a Responsibility and Fair Dealing an Obligation"

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"...We plugged a "Money-leak" in our Cotton Ginning Plant

by installing BUSS Super-lag FUSES"

ELECTRICIAN *James B. Howard*
SAN JOAQUIN GINNING CO., EARLIMART, CALIF.

Check these Facts!

Mr. Howard still speaking; "When we built our cotton ginning plant at Earlimart in 1936 we installed regular 400 ampere fuses, the maximum size allowable, in the main switch. During the season (1936) we were handicapped by frequent blowing of these fuses due to current surges caused by the cotton pressing machines being forced too hard.

"These shutdowns, sometimes occurring as often as twice in twenty-four hours closed down the entire plant, stopped machinery, ventilation blowers, etc., and left workmen standing idle.

"In the Fall of 1937 installed BUSS Super-Lag Fuses to the great satisfaction of all concerned. They really "plugged this money-leak" for we haven't had a main fuse blow since."

BUSS

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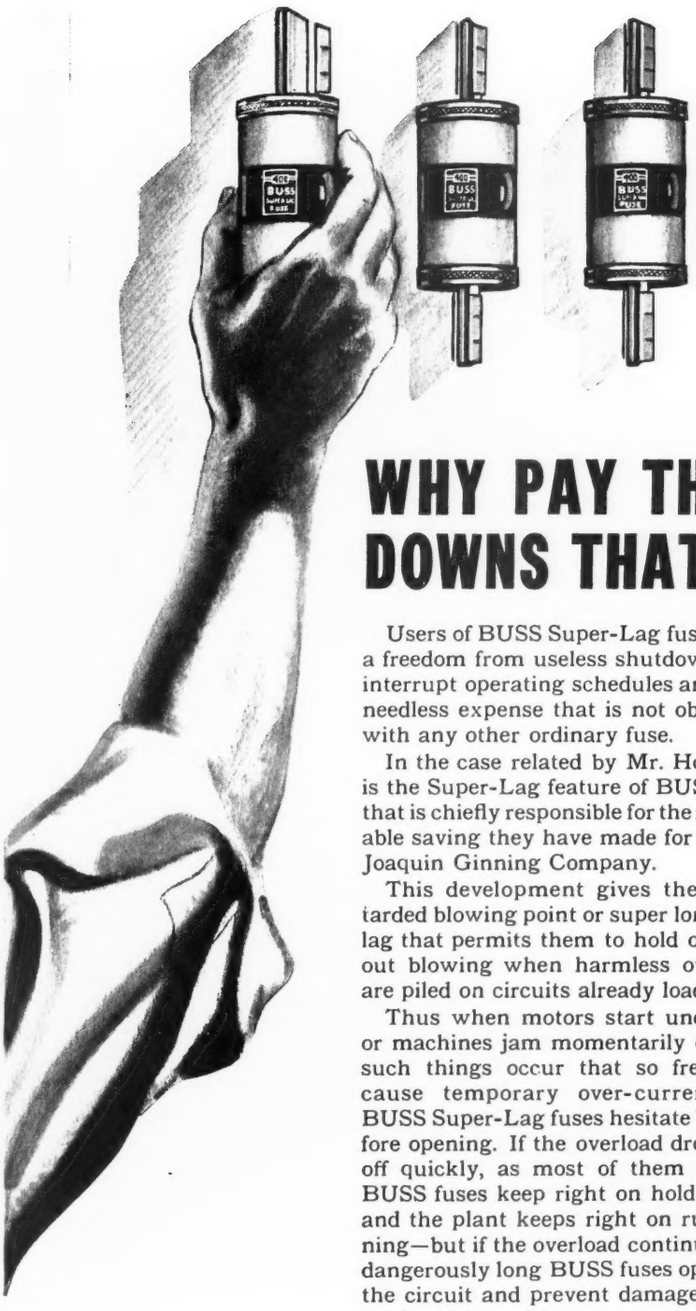

WHY PAY THE BILLS FOR SHUT-DOWNS THAT CAN BE AVOIDED??

Users of BUSS Super-Lag fuses enjoy a freedom from useless shutdowns that interrupt operating schedules and cause needless expense that is not obtainable with any other ordinary fuse.

In the case related by Mr. Howard it is the Super-Lag feature of BUSS fuses that is chiefly responsible for the remarkable saving they have made for the San Joaquin Ginning Company.

This development gives them a retarded blowing point or super long time-lag that permits them to hold on without blowing when harmless overloads are piled on circuits already loaded.

Thus when motors start under load or machines jam momentarily or other such things occur that so frequently cause temporary over-currents BUSS Super-Lag fuses hesitate before opening. If the overload drops off quickly, as most of them do, BUSS fuses keep right on holding and the plant keeps right on running—but if the overload continues dangerously long BUSS fuses open the circuit and prevent damage to equipment or plant.

The design of the BUSS Fuse-Case also saves users time and money. It reduces to a minimum any chance for poor contact to develop in the fuse itself.

Hence heating from such poor contact that so often causes needless blows is practically wiped out.

Why not investigate as did Mr. Howard?

While it is not possible to prove actual superiority of BUSS Super-Lag fuses thru the pages of a book it is possible to present facts that will be of profitable interest to anyone concerned with plant operation or electrical maintenance.

Thousands of executives, like Mr. Howard, have found the book "How to select renewable fuses" of absorbing interest. It deals with fuse design and its relation to plant operation.

We will be glad to send you a copy, just ask for the Rb book.

BUSSMANN MFG. CO.
UNIVERSITY AT JEFFERSON · ST. LOUIS
Division of McGraw Electric Company

WHY BUSS FUSES DON'T BLOW NEEDLESSLY
10 FEATURES in the design of the FUSE-CASE help make it possible..
The SUPER-LAG development in the FUSE-LINK completes the job.

Super-Lag FUSES

BUSS 1914 Silver Anniversary 1939 25 years progress in fuses

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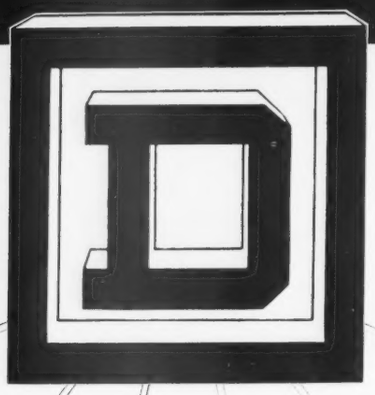
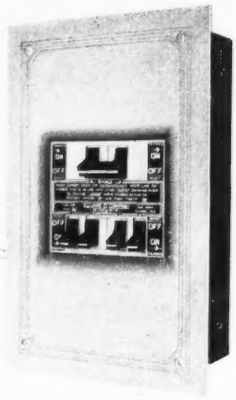
SQUARE D EQUIPMENT FOR EVERY APPLICATION



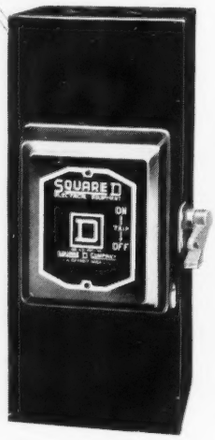
Saflex Panelboard. Power and Lighting



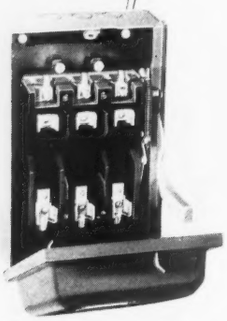
Multi-breakeR Load Center for Controlling Groups of Lighting Circuits

● Square D electrical equipment includes safety switches, range switches, power and lighting panelboards, industrial circuit breakers, Multi-breakeRs, electric motor control and SQUARE-Duct. A complete, quality line for the efficient control and distribution of electric current in the home, on the farm, in commercial buildings and industrial plants.

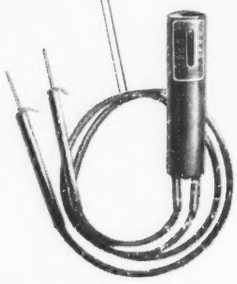
Multi-breakeR Panelboard—Narrow Column Type



Industrial Circuit Breaker



Type A, Heavy Duty Industrial Safety Switch



Voltage Tester Used on All Voltages (110 to 600) AC or DC

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

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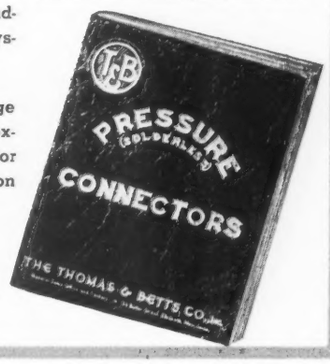
About 1800 Time Savers FOR MODERNIZATION

PRESSURE CONNECTORS

(SOLDERLESS)

About 1800 opportunities to save time and labor in the electrical end of plant maintenance and construction are found in the new Thomas & Betts catalog.

The Pressure (Solderless) Connectors illustrated—for Wire, Cable, Rod, Tubing and Bar—are truly designed and engineered to perform specific services in new and better ways—each is an achievement in modernization which outmodes gadgets and hit or miss attempts of yesterday to provide dependable electrical connections in industrial wiring systems.



You will find the new and complete T&B 100-page Catalog valuable assistance on new wiring, on extension work, and for maintenance. Write today for your copy—mailed promptly and without obligation on request. Ask for Catalog No. 100.

THE THOMAS & BETTS CO., Inc.
MAIN OFFICE and FACTORY ELIZABETH N. J. U. S. A.

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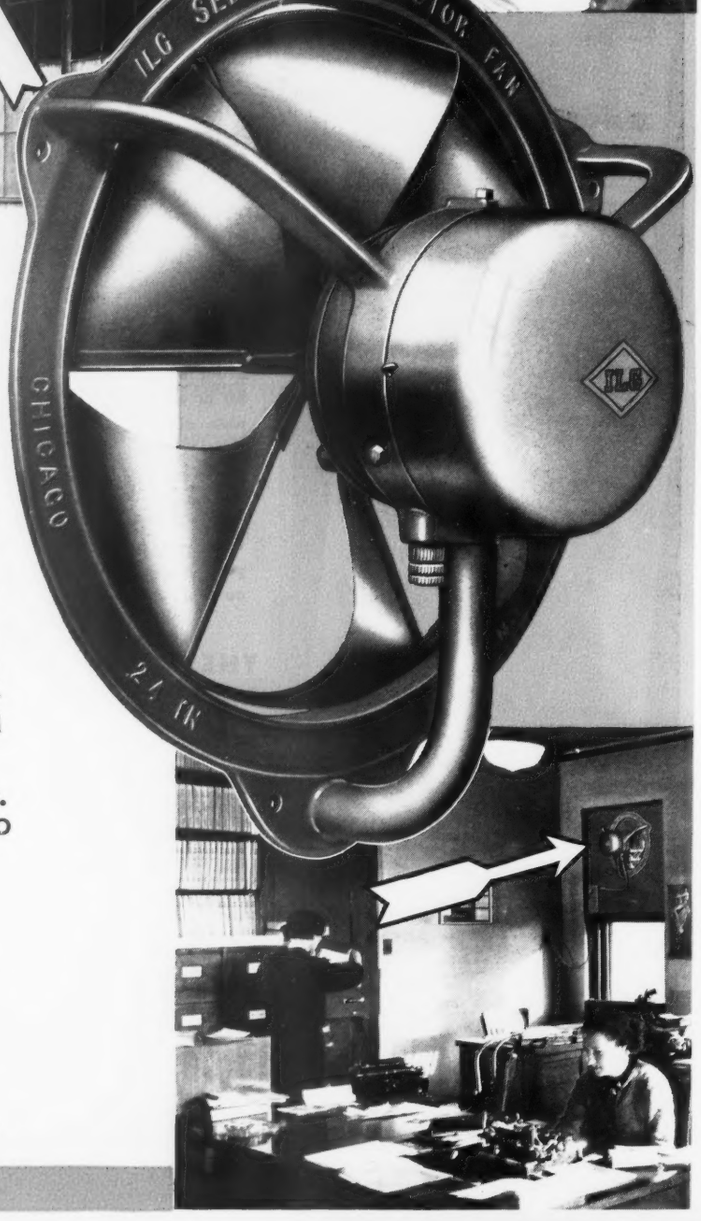
Increased Efficiency *For* FACTORY WORKERS



ILG Electric Ventilation *Corrects Any Bad Air Condition*

Vapor, fumes, and objectionable odors are quickly removed . . . fire and combustion hazards are minimized . . . ventilation is positive all year 'round. Whether yours is a simple problem of providing air comfort for your private office or cooling hot spots or ventilating your plant for better working conditions, it can be economically solved with one or more Ilg electric ventilating fans—powered by the Ilg self-cooled motor . . . guaranteed as a complete unit. Send for illustrated, condensed catalog.

ILG ELECTRIC VENTILATING CO.
2865 N. CRAWFORD AVE., CHICAGO
Offices in 43 Principal Cities

ILG
VENTILATION
and Air Conditioning

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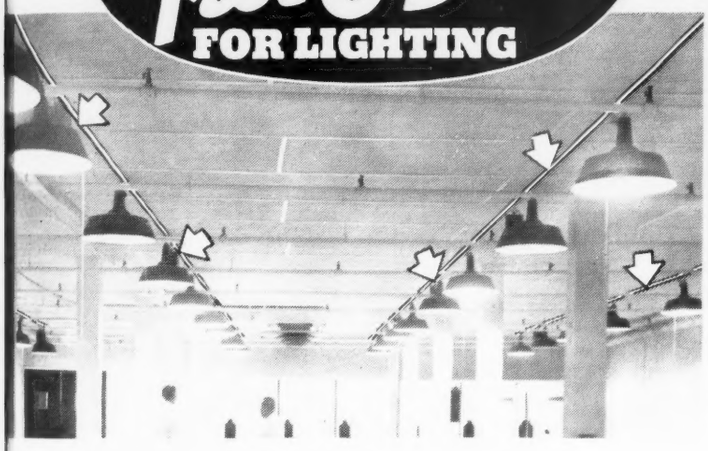
Today and Tomorrow

. . keep your plant FLEXIBLE with BULL DOG BUS SYSTEMS

BULL DOG Trol-E-Duct FOR LIGHTING



Every inch of Trol-E-Duct is a potential electrical outlet. With it you can have a Lighting System that need never become obsolete. The ability to move your lights to any point in the Duct run or to add new lighting units where desired, assures the right kind of GENERAL LIGHTING to conform with the structural design of a building and the right kind of LOCAL LIGHTING to meet any particular machine layout—present or future. With TROL-E-DUCT your Lighting System can always be kept ADEQUATE and MODERN.

The 5 Ft. HANDY SET—

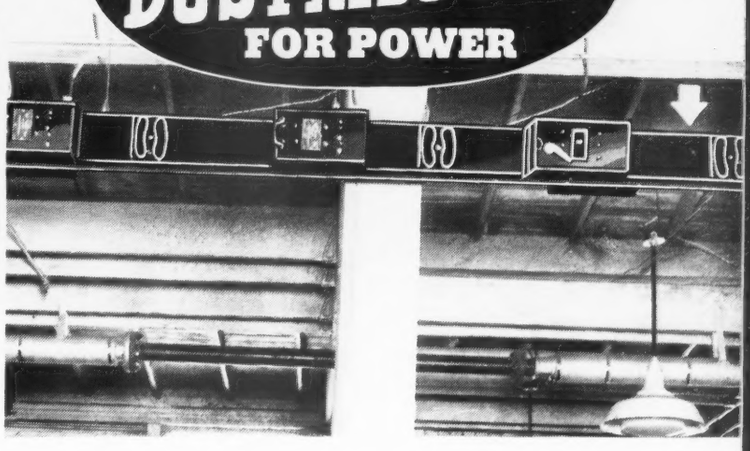
WITH TERMINAL TYPE TROLLEY **$3.75** LIST

WITH RECEPTACLE TYPE TROLLEY **$4.00** LIST

The Set includes a 5Ft. section of duct, feed in end cap, trolley entrance end cap, two supporting hangers, five-foot cord with attachment plug and one trolley collector.

The 5Ft. Trol-E-Duct HANDY SET, a complete unit in itself, can be installed in a few minutes Pick out some spot in your Factory and for less than Four Dollars prove to yourself, if you wish, the flexibility and adequacy of this extended convenience outlet, before considering a larger system investment.

BULL DOG BUStribution FOR POWER



You can plan for tomorrow when the power outlet system in your plant today is a Bull Dog BUStribution system. BUStribution gives you flexible power circuits. It consists essentially of inter-connected sections of duct in which busbars are mounted. Crescent-shaped openings in two sides of the duct, permit the "plugging-in" of fusible switches, circuit breakers or other forms of circuit protective devices . at any time or at any point . . . all making for an electric power system that is MOBILE, FLEXIBLE and MODERN in the highest degree

Pioneers of Flexible Electrical Distribution Systems

BULL DOG ELECTRIC PRODUCTS COMPANY

MANUFACTURERS OF VACU-BREAK SAFETY SWITCHES, PANELBOARDS, SWITCHBOARDS, DUCT SYSTEMS—FOR LIGHT AND POWER

DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA LTD., TORONTO, ONT.

Write for descriptive Bulletins on these Flexible Busway Systems.

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Simplex-TIREX Cords and Cables for —Safety —Service —Economy

TIREX
SELENIUM
Rubber Armor
Unequalled for Long-Life-Toughness and Resistance to Abrasion.

The selenium rubber armor, a selenium rubber sheath containing not less than 60% of new para grade rubber is a distinguishing feature of Simplex-TIREX Cords and Cables. It is unexcelled for toughness and resistance to abrasion.

An attractive 63 page catalog on Simplex-TIREX Cords and Cables is now available.

In Simplex-TIREX you get the original rubber sheathed flexible cords or cables and the benefit of twenty years development and improvement which results in long life and trouble-free, economical service. With TIREX you can do more work, you can do it quicker and more efficiently and your cord or cable repair and maintenance cost can be cut to almost nothing. You will no longer be annoyed by delays and loss of time caused by cord or cable failure.

Cleanliness, freedom from dust and fraying, smoother outer surface, no kinking, light weight and long life are reasons why TIREX selenium rubber armored Portable Cords and Cables will give you satisfactory service.

When you need a flexible rubber sheathed cord or cable for portable electrical tools or other equipment that must stand up under constant punishment and abuse Simplex-TIREX is the cable to specify. To enable you to be sure you get TIREX and to make easy identification possible the name "SIMPLEX-TIREX" is molded into the 60% rubber armor that protects against abrasion, cuts and bruises.

Simplex Wire & Cable Company, 79 Sidney Street, Cambridge, Mass.

Simplex-TIREX

The only cable armored with Selenium Rubber

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Your Drill Problems Solved

(in one easy lesson) with

Thor Electric Drills

"TAKE A TIP, FELLAH! My new Thor Drillmaster has saved me money every day. For maintenance and light-duty work there isn't a tool in the running with it in its price class."

THE THOR DRILLMASTER $19.95
¼" capacity drill for all-around, light-duty work. The low-priced drill that brings Thor quality within the reach of every tool user . . . you get Economy and Performance at one low cost.

THE THOR U14A.... .... $32.50
¼" capacity drill for hard production service. Small, light and sturdy . . . with the power of tools *twice* its size.

"FOR YEARS AND YEARS we've been cutting costs with the Thor U14A. It's the pioneer of small, light-weight production drills."

Thor offers more!

IN PORTABLE ELECTRIC TOOLS

INDEPENDENT PNEUMATIC TOOL COMPANY · 600 WEST JACKSON BOULEVARD · CHICAGO, ILLINOIS

BIRMINGHAM · BOSTON · BUFFALO · CLEVELAND · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK · PHILADELPHIA · PITTSBURGH · ST. LOUIS · SAN FRANCISCO

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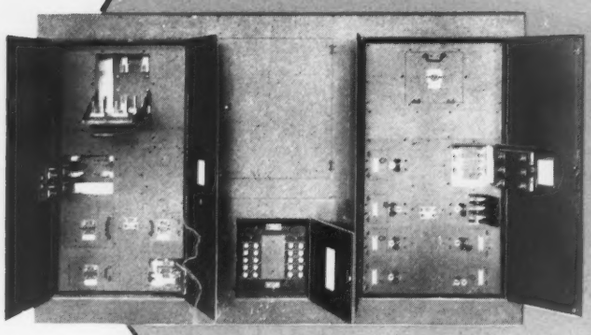
EST. 1891
THE SIGN OF A FA BETTER JOB

Frank Adam

PANELBOARDS and SWITCHBOARDS

FRANK ADAM ELECTRIC CO.
ST. LOUIS, MO. U.S.A.



FA Dead Front Panelboard for Light and Power Feeder Distribution.

Rear view of FA Dead Front Switchboard—with Cable Box at top—showing Bus Construction and General FA Structural Design.

Engineered and Designed by Specialists

TO FIT HEAVY INDUSTRIAL JOBS

The value of Specialized Engineering and Design is nowhere more evident than in FA Switchboards and Panelboards for Heavy Industrial Construction!

For more than 40 years, FA has specialized in "Custom Built" Panelboards and Switchboards for large installations — always with the result that such FA equipment fits the particular and often complicated industrial requirements, at an ultimate saving to the user because of trouble-free, lasting service.

Avail yourself of this highly specialized service on your next Switchboard and Panelboard job. Our experienced Sales Engineers, located in principal cities, will be glad to give you the benefit of their many years of training in this special class of work . . . Also—Specify New FA Standardized Circuit Breaker Type Lighting Panelboards . . . Send for Catalog No. 56.

ANNOUNCEMENT!

A complete line of FA high grade Safety Switches—having many new features and specially designed for heavy duty industrial use—will be introduced to the field later in 1939.

Frank Adam
ELECTRIC COMPANY
ST. LOUIS

FA TRADE MARK **PRODUCTS** .. *"The Sign of a Better Job"*

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THE *Right* WAY TO PLAN ELECTRICAL DISTRIBUTION

For FLEXIBILITY in PLANT LAYOUT

To meet both PRESENT and FUTURE needs

TRUMBULL FEEDER DISTRIBUTION SYSTEMS

●

BUSS-WA, the heavy duty enclosed bus bar distribution system for main electrical arteries.

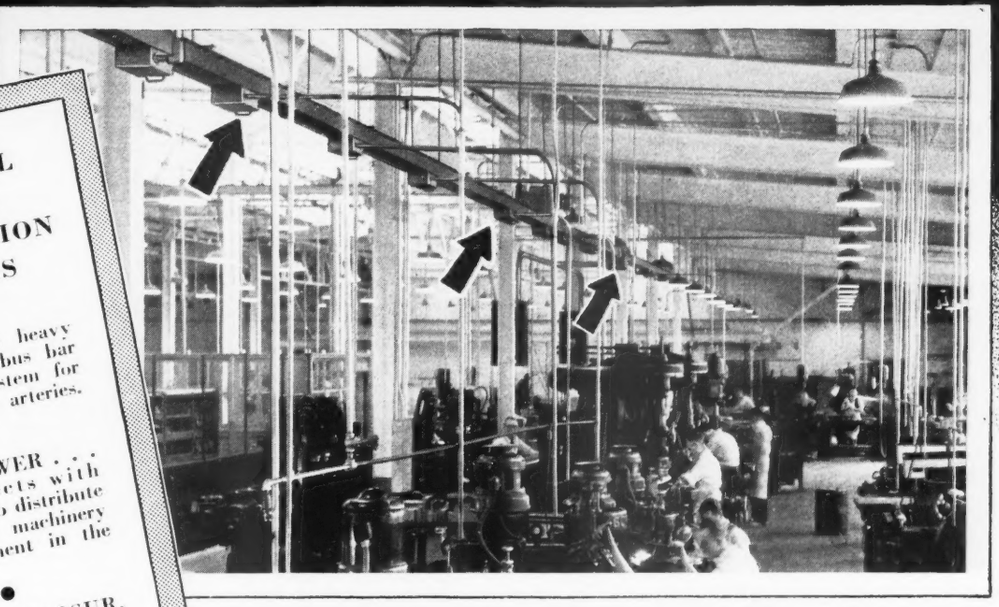
●

FLEX-A-POWER . . . interconnects with BUSS-WA to distribute current to machinery and equipment in the plant.

●

TROLLEY-CLOSUR, to provide safe and dependable current supply, with free movement, for portable tools and machines.

●



TRUMBULL FLEX-A-POWER

The Convenience outlet for Power in Industry

Right . . . for These Reasons

FLEXIBILITY in layout and installation of self-contained interconnected units, to meet every requirement of building plans and equipment.

FLEX-A-PLUGS, providing quick "plug-in" connection to load at any desired point, include various combinations of switches and automatic overload protection, can easily be removed from one point in the system to another.

LOW INSTALLATION COST, combined with the exceptional convenience and economy of a system that can be quickly changed to meet production needs. Flex-A-Power equipment is completely salvable.

FREE FROM MAINTENANCE, with all parts and connections quickly accessible and with the entire absence of perishable materials in FLEX-A-POWER construction. Approved by Underwriters . . . affording maximum safety to both men and equipment.

Right . . . for These Applications

FLEX-A-POWER provides the high degree of flexibility in plant electrical distribution made increasingly necessary by modern production methods.

When used either alone or in conjunction with Trumbull BUSS-WA and Trumbull TROLLEY-CLOSUR Systems, FLEX-A-POWER permits rearrangement of electrically driven machinery and extension of facilities in minimum time and at low cost.

One prominent manufacturer stated recently that the entire cost of the system had been more than paid for by savings effected in rearranging machinery in his plant. But even where this factor is not of primary importance, FLEX-A-POWER still provides a simple, economical, clean cut system for distributing power to electrical equipment.

Send for the New Trumbull Feeder Distribution System Bulletin Number 156.

THE TRUMBULL ELECTRIC MANUFACTURING CO., A GENERAL ELECTRIC ORGANIZATION **PLAINVILLE, CONN.**

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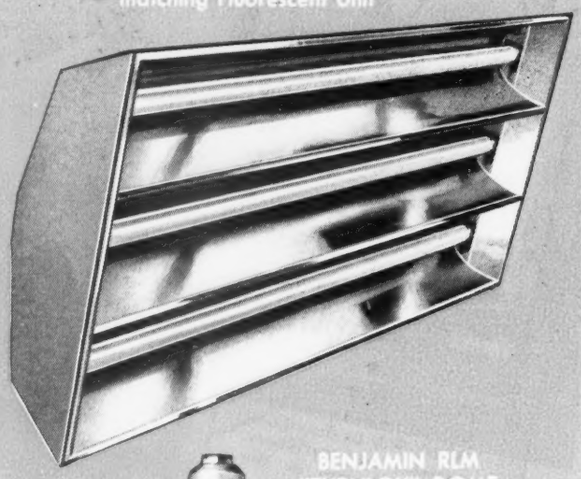
HEADQUARTERS
FOR INDUSTRIAL LIGHTING EQUIPMENT

NEW BENJAMIN "FLUR-O-LINE"
"Amazingly Versatile for Fluorescent Lighting"

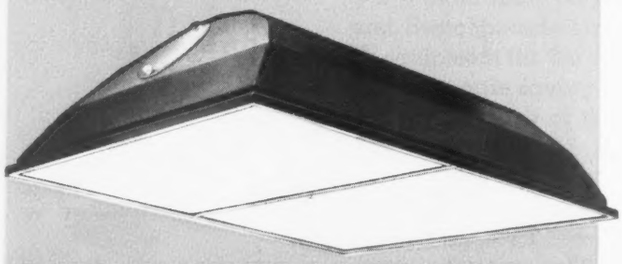
NEW BENJAMIN "DAYLITER"
"Outstanding Industrial Color-matching Fluorescent Unit"



BENJAMIN RLM "SILVERED-BOWL" DIFFUSER
"Eye Comfort, Indirect Lighting Effects At LOW COST"

BENJAMIN "STOCK-BIN LITE"
"Provides uniform illumination of bins, shelves and stacks"

BENJAMIN RLM "TURNLOX" DOME REFLECTOR
"Patented Hood Construction Reduces Maintenance Cost"



BENJAMIN "SKYLIGHT" REFLECTOR
"Produces a luminous ceiling to reduce glaring reflections"

Typical of Benjamin leadership in industrial lighting are these newest additions to the line—new tools for seeing that help improve work standards and cut production costs.

No matter what the lighting problem—no matter how exacting may be your requirements—there is, in the Benjamin line, a reflector or specialized lighting unit designed in accordance with the most advanced illuminating engineering practice, that correctly meets your needs.

When you think of lighting, think first of Benjamin. You can always be sure of quality and lasting satisfaction at "Lighting Headquarters." Benjamin Electric Mfg. Co., Des Plaines, Illinois.

Distributed Exclusively Through Electrical Wholesalers

BENJAMIN TRADE MARK

Distributed In Canada by Amalgamated Electric Corp. Limited

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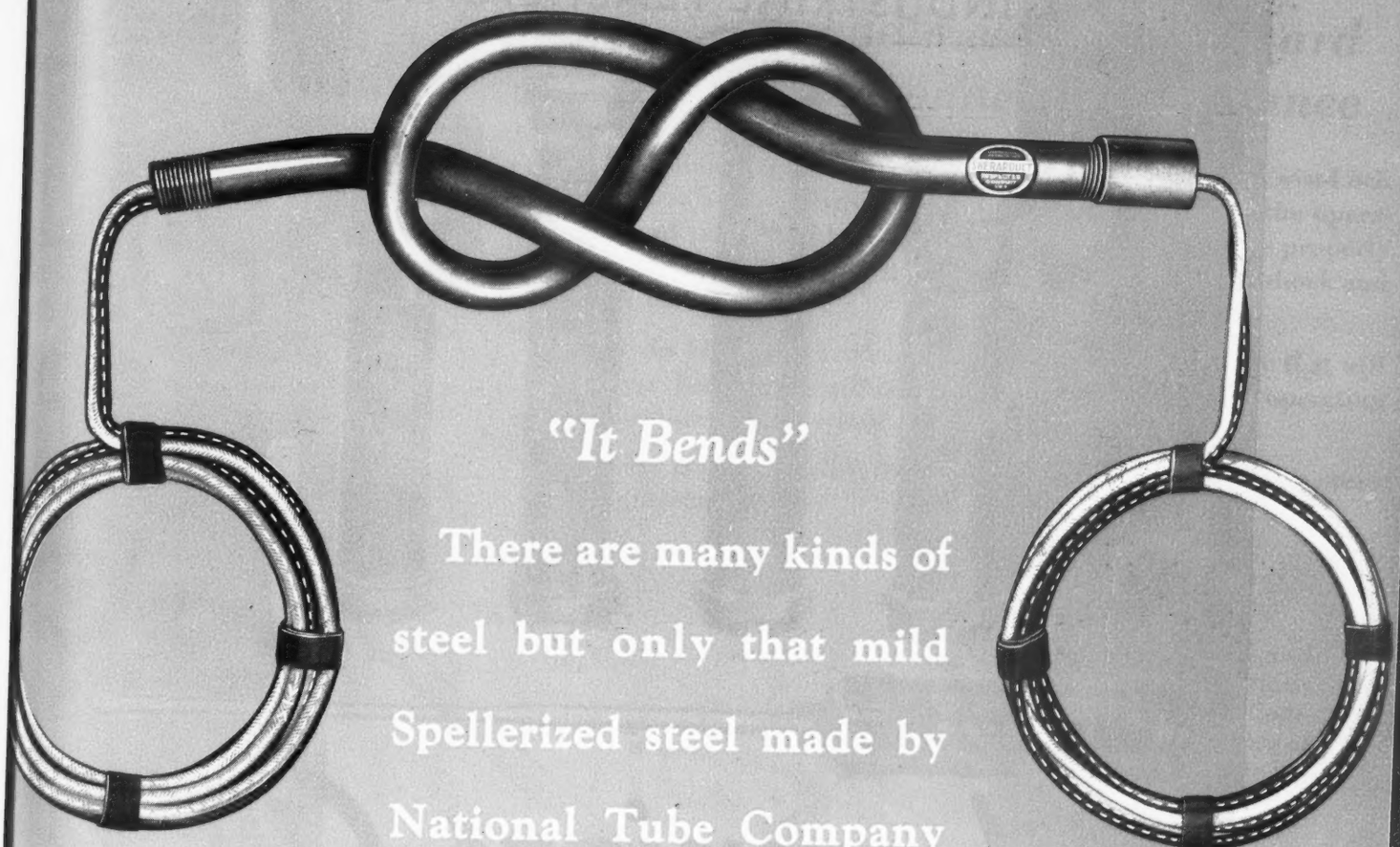
There is only one "Sherarduct"



"It Bends"

There are many kinds of steel but only that mild Spellerized steel made by National Tube Company gives that ductility so necessary in fabricating conduit into the job.

Threads are always sharp and clean.

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EVEREADY

TRADE-MARK

INDUSTRIAL FLASHLIGHTS

Champions All

EACH type of "Eveready" Industrial Flashlight is a champion in its own class. Take the work around motors, generators, switchboards and other exposed electrical apparatus; here the new Waterproof Flashlights 3254 and 3354 are incomparable. They are completely covered with a soft rubber sleeve protecting them from short circuits, acids, gasoline, oil, alcohol and dirt. Unbreakable lenses and chrome plated reflectors insure long and faithful service.

Then there are the general purpose Flashlights 3351 and 3251 cased in semi-hard rubber. They have hand replaceable switches and unbreakable lenses and are unaffected by water, oil, gasoline, alcohol, acids or dropping impact. For the hard-to-get-at places encountered in railroad service the No. 3258, new Flexible Extension Flashlight, is the real champ. Its steady light reaches inaccessible parts of moving machinery, interiors of journal boxes, drums, barrels and boxes — the handiest light for engineers, inspectors and mechanics.

The word "Eveready" is a registered trade-mark of National Carbon Co., Inc.

NATIONAL CARBON COMPANY, Inc.

RAILROAD DIVISION

NEW YORK, N. Y.

San Francisco, Cal. — *Unit of Union Carbide and Carbon Corporation* — Chicago, Ill.

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HUBBELL

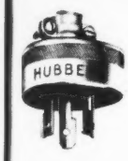
Twist-Lock DEVICES

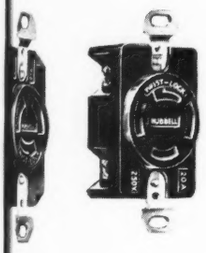
. . . eliminate electrical hazard
banish disconnection nuisance

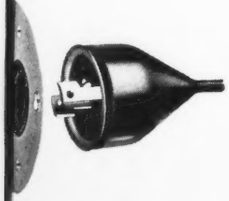
Providing a locked electrical connection, Hubbell Twist-Lock Devices assure continuous, uninterrupted service in the operation of portable motor-driven tools and equipment — properly polarized and grounded, they insure protection from shock and fire hazards.

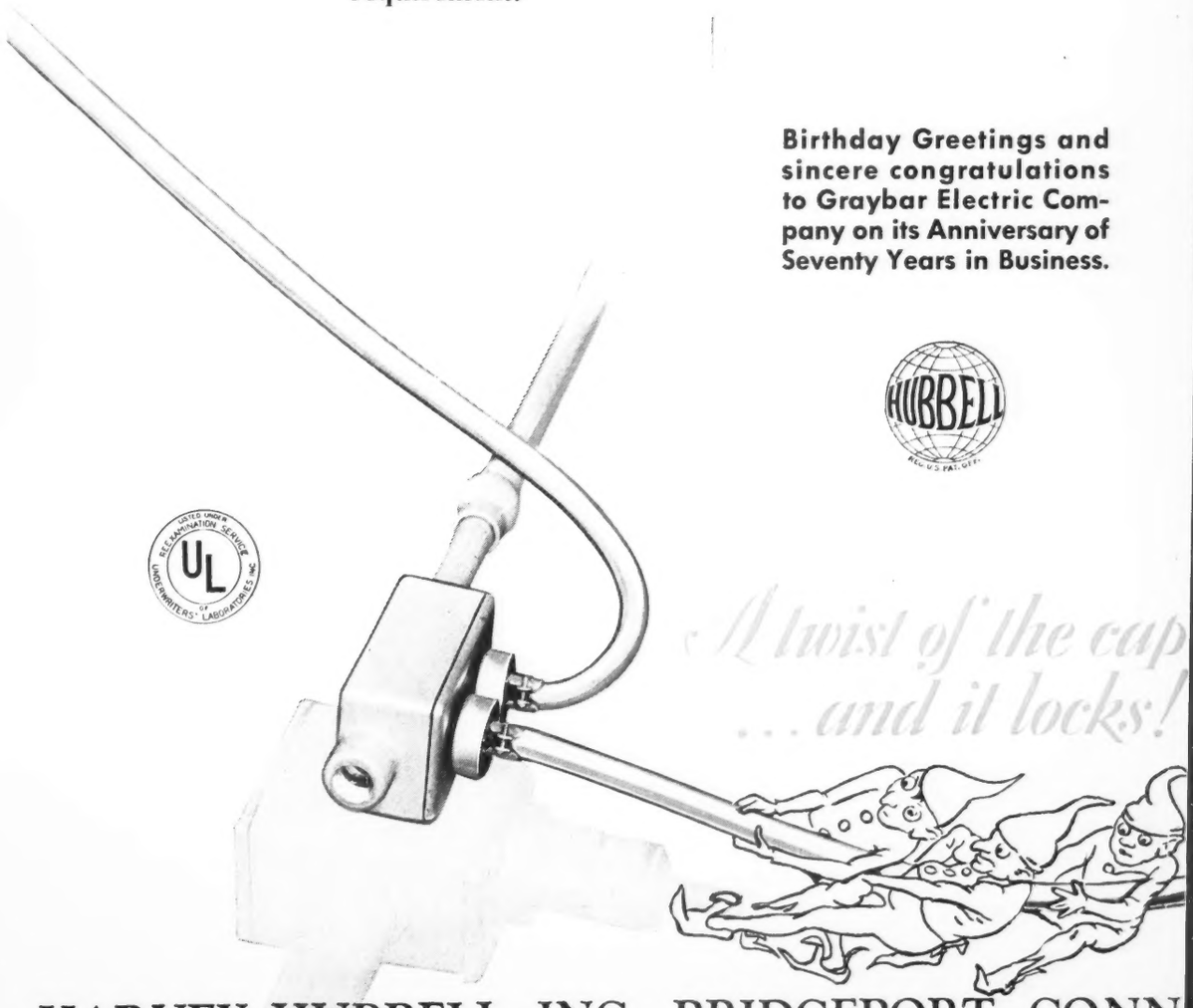
A twist of the cap makes a positive lock-fast connection that will never part in the middle of a job — secure against operating vibration, pulling strain or rough usage.

There is a 2-Wire, 3-Wire, and 4-Wire Twist-Lock to meet every requirement.









Birthday Greetings and sincere congratulations to Graybar Electric Company on its Anniversary of Seventy Years in Business.

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UNDERWRITERS' LABORATORIES INC.

HARVEY HUBBELL, INC., BRIDGEPORT, CONN

Yesterday Today and Tomorrow

everything electrical

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70th ANNIVERSARY
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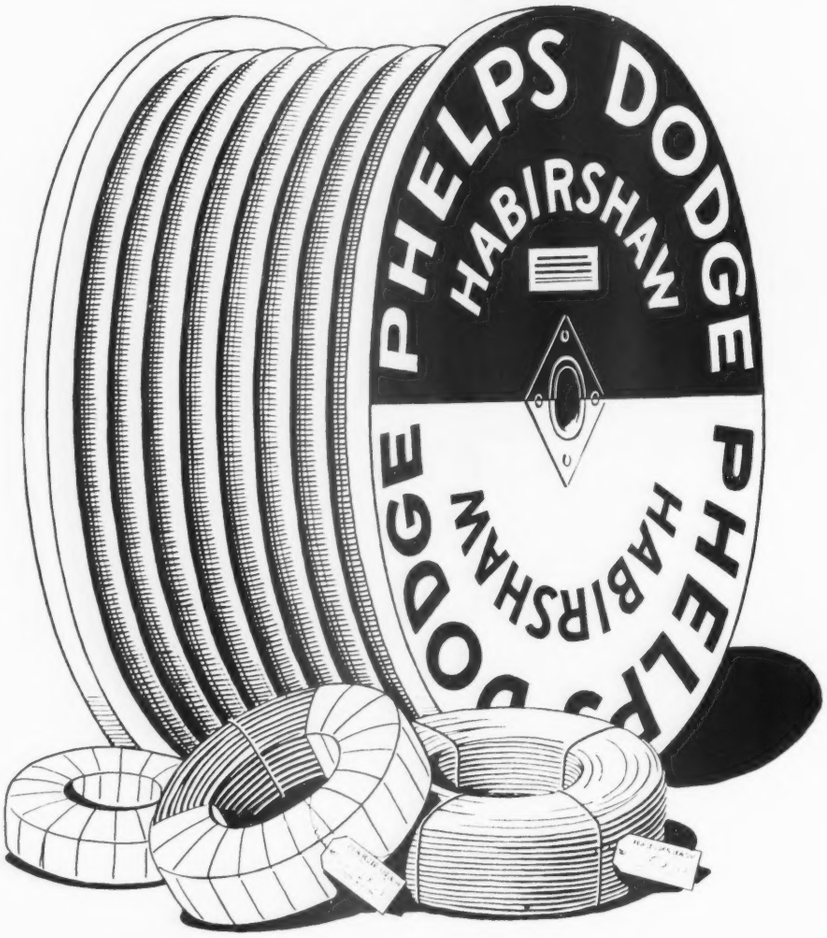
HABIRSHAW
QUALITY
WIRES AND CABLES



PLUS GraybaR SERVICE

HABIRSHAW
CABLE AND WIRE DIVISION
PHELPS DODGE COPPER PRODUCTS CORPORATION

General Sales Offices
40 WALL STREET, NEW YORK

Mills: BAYWAY, N. J. YONKERS, N. Y. FORT WAYNE, IND. LOS ANGELES, CAL.

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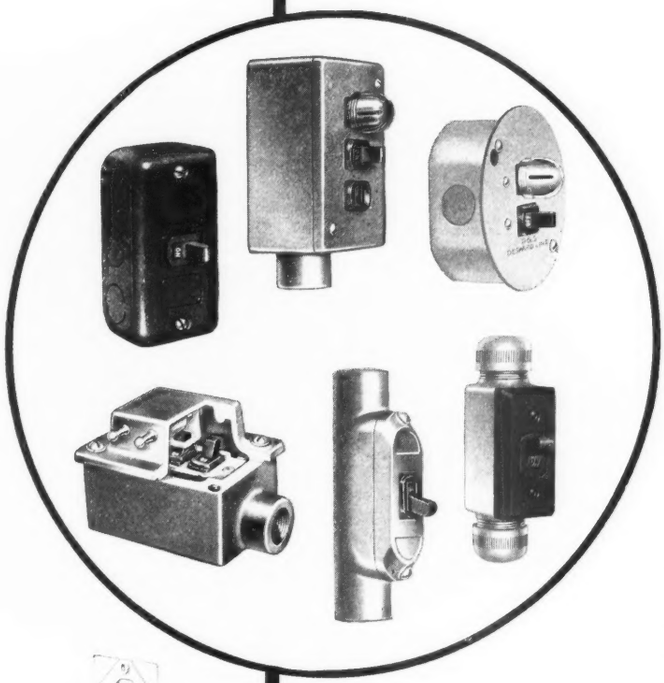
DESPARD *Wiring* Devices
the UP-TO-DATE Wiring System

Offering unlimited possibilities for expanding present wiring service . . . . NEW WORK . . . QUICK REPAIRS . . . REPLACEMENTS at LOW COST and with MINIMUM INVENTORIES

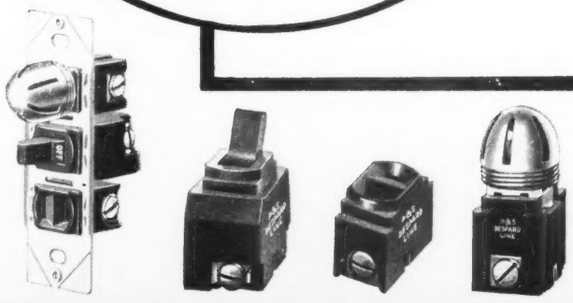


When you're considering new work, maintenance or additions to present plant wiring systems, investigate P&S Despard Wiring Devices.

These modern, precision-made devices are interchangeable and insure a tried and proved method of making your wiring more convenient.

We welcome an opportunity to show you the economy of using the P&S Despard system—the savings you can make through simplified and reduced stocks of wiring devices needed for upkeep and repair—the low installation cost of additions or new wiring.

These devices are the result of more than 40 years experience and can therefore be depended on to meet the most exacting requirements in quality, precision and utility.



For complete information
FILL OUT *and* MAIL COUPON

or write to—Department F

PASS & SEYMOUR, INC.
Solvay Station
Syracuse, New York

Dept. F
PASS & SEYMOUR, INC.
Solvay Station, Syracuse, N. Y.

Kindly send me complete information on P&S-Despard Wiring Devices for Industrial Applications. It is understood this request incurs no obligation on my part.

Name .....

Position .....

Company .....

Address .....

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Frank Adam Electric Co.

Benjamin Electric Mfg. Co.

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Habirshaw Cable & Wire Division, Phelps Dodge Copper Products Corp.

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Ilg Electric Ventilating Co.

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National Electric Products Corp.

Pass & Seymour, Inc.

Simplex Wire & Cable Co.

Square D Company

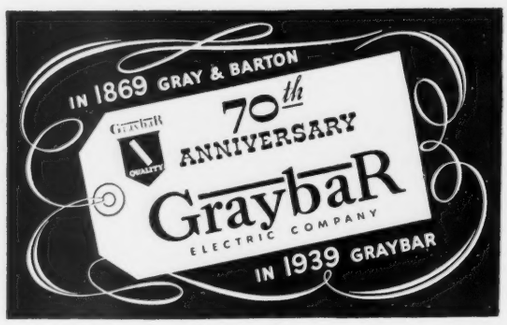
Thomas & Betts Co.

Trumbull Electric Mfg. Co.

Webster Electric Co.

Leaders in the Industry

GraybaR makes their products conveniently available to you

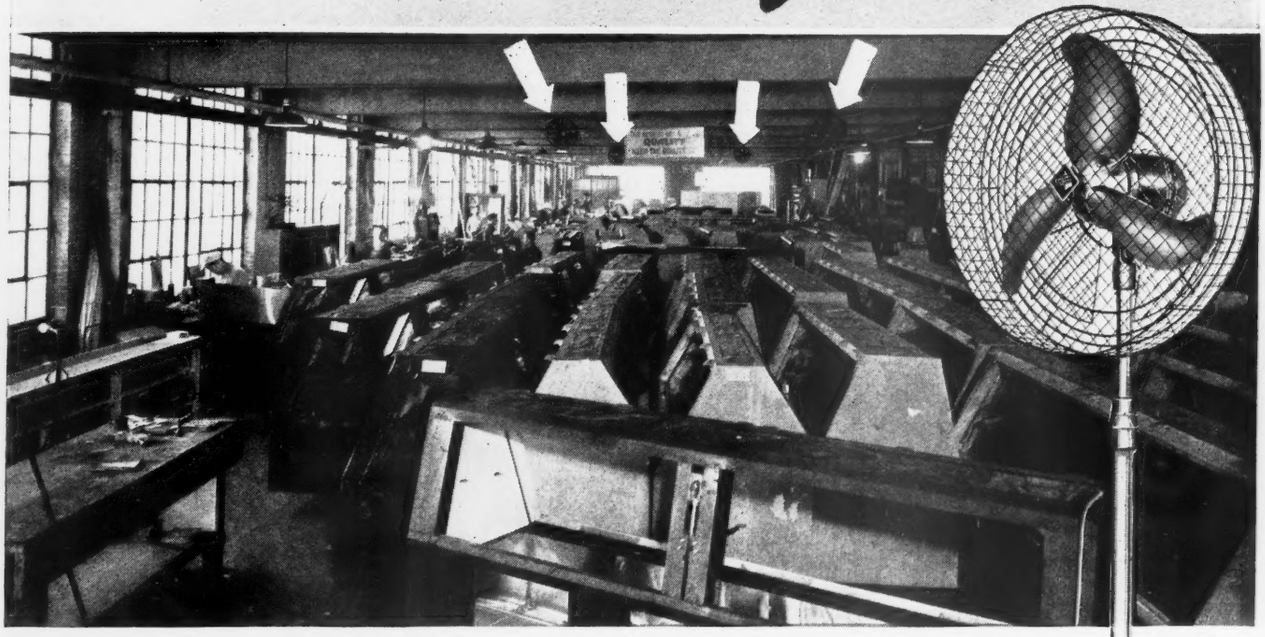


Each of these Graybar suppliers stands out as a leader in its own product group. Each has established an industry-wide reputation for thoroughly reliable equipment.

When you purchase from Graybar, you select from the products of the foremost manufacturers of the electrical industry. You select electrical items already "pre-selected" by Graybar to satisfactorily meet industry's most rigid requirements.

You get, too, prompt *action service* from Graybar... to bring these products quickly, conveniently and economically to you. A nearby Graybar warehouse...manned by an experienced, thoroughly-trained Graybar staff ...brings you what you want, when and where you want it. And behind the proven dependability of these products stands the *extra* assurance of Graybar's own guarantee...as well as Graybar's 70 year old reputation for satisfying the customer.

Team up the Power OF THESE *Powerful* FANS!



Step Up Production – Keep Workers Cool and Efficient with EMERSON-ELECTRIC *High Velocity* AIR CIRCULATORS

Healthful, comfortable working conditions mean steady, profitable production...harmonious labor relations. And Emerson-Electric *High Velocity* Air Circulators can be adapted to any air circulation problem . . . general or local.

Heavy-duty, grease-packed motors drive great volumes of cooling breezes over large areas—running 6,000 hours (3 average seasons) *without* re-lubrication. Seven models, 3 and 4-blade fans, each with floor, ceiling, counter or wall bracket mountings. Investigate Emerson-Electric *High Velocity* Air Circulators today. Write for the Emerson-Electric Air Circulator Bulletin No. 246.

Emerson-Electric Power-Duty Exhaust Fan 30-inch, Two-Speed, Direct-Drive

EMERSON-ELECTRIC Power-Duty Exhaust Fans – Exhaust Up to 16,800 Cu. Ft. Per Min.

No job of removing toxic gases, dust, "smoke" or excessive heat is too big for these powerful fans. They keep the air changed, regularly, with the least possible expense. Five sizes, 12 to 30-inch direct drive in two-speed, ball-bearing and single-speed, sleeve-bearing; also in 36, 42, and 48-inch single-speed, belt-driven models. Automatic shutters for all sizes. Write for bulletin; "How to Select Emerson-Electric Fan Equipment" No. 247.

THE EMERSON ELECTRIC MFG. CO. • ST. LOUIS • CHICAGO • NEW YORK

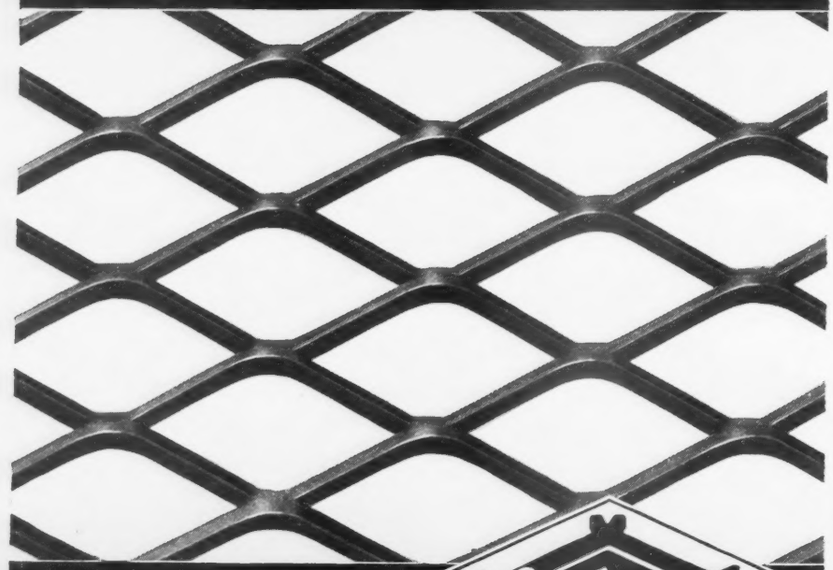
EMERSON ELECTRIC

MOTORS — FANS — APPLIANCES

156

LEADERS IN THE FAN AND MOTOR INDUSTRY SINCE 1890

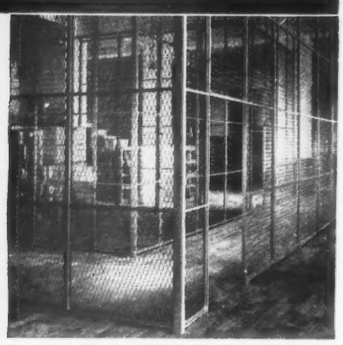
FOR A *Brighter* PLANT



USE Steelcrete *Expanded Metal*

for **PARTITIONS BINS AND SHELVING**

It Lets the Light Through



Steelcrete Expanded Metal, with its open diamond mesh, lets the light through, speeds up the selection of stock and conserves electricity. Steelcrete Expanded Metal is supplied in various gauges and sizes of sheets and in two styles—Flattened Mesh for use in products requiring a smooth surface such as baskets and shelving and in Safe-T-Mesh which offers maximum rigidity and strength for articles such as window guards and partitions. Write the nearest office for a copy of the Steelcrete handbook describing Expanded Metal and its many uses.

"IT'S WHEELING STEEL"

THE CONSOLIDATED EXPANDED METAL COMPANIES
WHEELING, WEST VIRGINIA
Branch Offices and Warehouses:
New York • Chicago • Detroit • Cleveland • Pittsburgh • Philadelphia • Boston • Buffalo • Houston • Atlanta
Export Office: 330 West 42nd St., New York, N. Y.

Bringing Your Buildings Up to Date

(Continued from page B—68)

available, some of which (such as precast gypsum or concrete slabs) possess high insulating value along with moderate weight and ease of installation. Metal decking insulated with cork slabs or other material has also come into wide use and merits careful consideration.

6

Are floors and floor coverings in need of repair?

Inspection should also include examination of supports to determine whether they are of adequate strength. Use of heavier machinery than formerly sometimes imposes loads that approach or may exceed the maximum for which the floors in old buildings were designed.

The question of whether to repair or replace an old floor often comes up. Suitability of the floor for the service has a definite bearing on that question.

Concrete floors have several advantages and are widely used. Unless repairs are skilfully made, however, the results are likely to be unsatisfactory. A number of patching materials and procedures have been developed that are claimed to give better results than can be obtained otherwise.

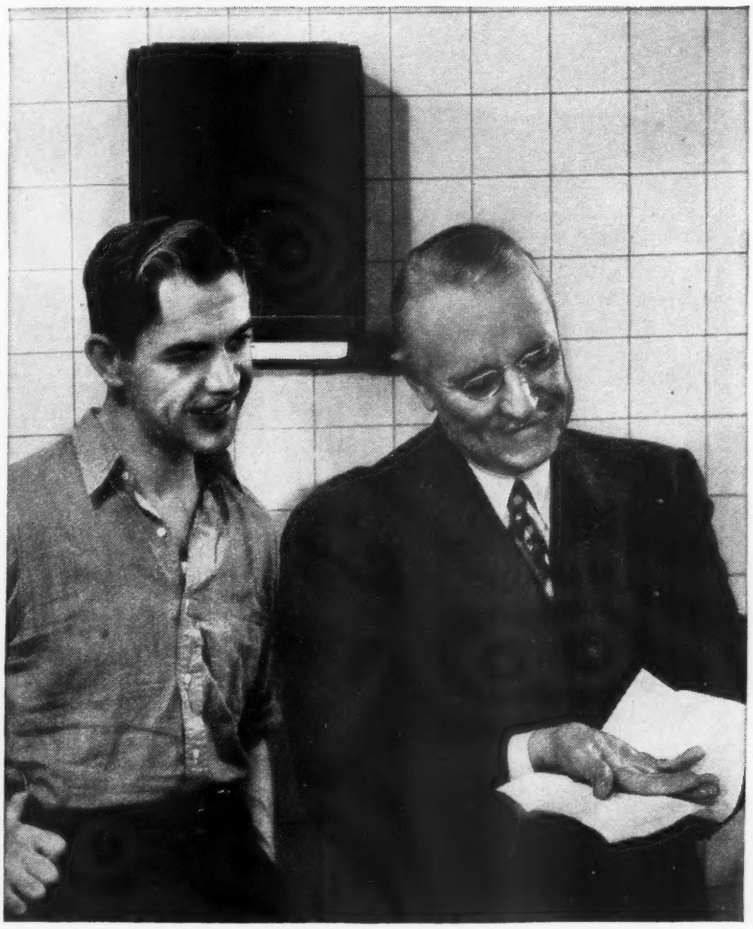
Other types of floors that are used in manufacturing areas include wood blocks or strips, asphalt mastic laid integrally or in the form of blocks or slabs, and felt or leather impregnated with asphalt and other materials. Hard brick is often used in such places as forge shops where the service or traffic is unusually severe. Where there is exposure to acids or chemicals, acid-proof brick set in bituminous compounds, or other constructions may be used.

Iron floor plates are very effective in protecting any type of floor in aisles and at points where service is severe.

For entrance lobbies, hallways, and offices, several types are avail-

A MAJOR MOVE IN MODERNIZING . . .

"SINGLE-STANDARD" WASHROOMS PLANNED BY SCOTT



IT PAYS to make plant washrooms as comfortable, convenient and sanitary as office lavatories. Employees appreciate this interest in their health and welfare . . . you get worthwhile returns in increased good will. And you can include these important advantages in the plans you're considering now, with the help of the Scott Washroom Advisory Service.

This valuable service applies practical, proved principles to washroom design. Trained staff members check every detail of plans against actual service conditions. They figure the exact number of basins and toilets necessary to handle required traffic without congestion. Special attention is given to the selection of fixtures best suited to each individual washroom . . . all equipment is properly placed for greatest convenience and economy. This advice costs nothing . . . results in far more efficient washrooms at no extra cost.

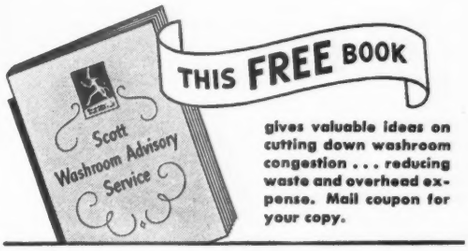
Before you start new construction, you'll want to read the interesting book shown below. It describes the Scott Washroom Service . . . gives new ideas on improving washrooms and reducing overhead expense. For your free copy, simply mail the coupon.

Fixtures for Every Need

Scott fixtures for ScotTissue and Towels are adaptable to every type of industrial installation. Special patented features assure maximum economy. And the Scott Washroom Advisory Service can show you how to arrange them for greatest convenience and efficiency.

Low-Cost Tissue & Towel Service

Now used in thousands of plants all over the country, ScotTissue and ScotTowels have proved their ability to go farther . . . reduce service costs. Men and women both like their unusual softness and absorbency . . . every employee will appreciate finding them in plant washrooms.


Scott Washroom Advisory Service
THIS FREE BOOK
gives valuable ideas on cutting down washroom congestion . . . reducing waste and overhead expense. Mail coupon for your copy.

• Executives may request a copy of "Scott Washroom Advisory Service" by attaching this coupon to firm letterhead. Scott Paper Co., Chester, Pa.

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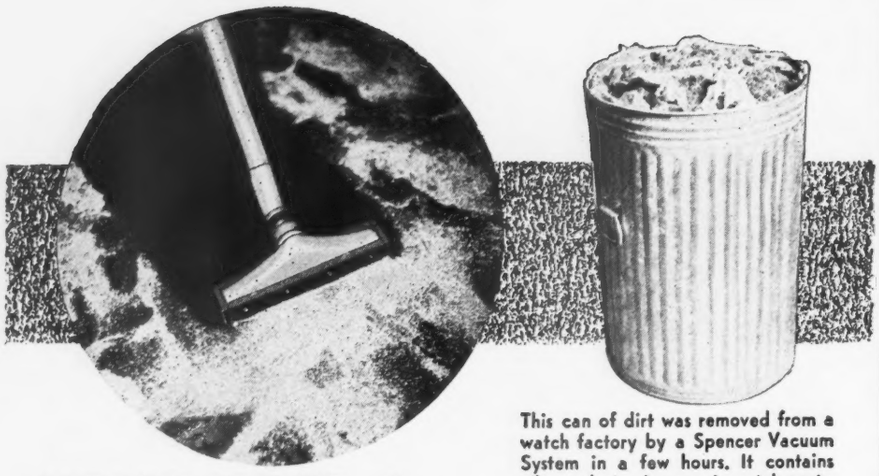
MAKERS OF SCOTTISSUE, WALDORF AND SCOTTOWELS FOR HOME USE

Trade Marks "ScotTissue, Waldorf, ScotTowels" Reg. U.S. Pat. Off.



This can of dirt was removed from a watch factory by a Spencer Vacuum System in a few hours. It contains oily sawdust, microscopic watch parts, glass, paper, lint and just plain dirt.

WHAT DOES A CAN OF DIRT A DAY COST YOU?

We mean the can of dirt you don't get—the part that is in cracks in the floors, in and under machinery, or stirred up with brooms to spread over your ceilings, walls, equipment and eventually the finished and unfinished goods.

You can figure the answer yourself. Just estimate roughly the annual worth of the following items:

A 25% saving in cost of cleaning floors .....
A 50% saving in cost of cleaning overhead .....
A 70% saving in cost of cleaning machinery .....
Saving due to reclaiming valuable materials .....
Saving by elimination of rejects due to dust .....
Value of reduced fire, explosion and health hazards .....
Saving in fuel by cleaning boiler tubes .....
Per Year Total $.....

The first three percentages are representative estimates made by present users of the Spencer Vacuum System. Spencer representatives will study your plant and make a specific estimate on request.

It Adds Up

It adds up to the fact that any one of these seven items may pay for a Spencer Vacuum System in two years. If you can save on two items there's a nice profit.

A survey of 444 users shows that most plants report savings on at least 3 items.

Compare what they are doing with Spencer Vacuum with present methods in your plant. The results are illustrated in the new Spencer Bulletin. Ask for Bulletin 120F.

150-C

SPENCER HARTFORD
CENTRAL AND PORTABLE VACUUM CLEANING SYSTEMS

THE SPENCER TURBINE COMPANY, HARTFORD, CONN.

able, including terrazzo, tile, magnesite composition, and wood.

Floor coverings laid over an existing concrete or wood floor have come into wide use. Asphalt tile, rubber tile and sheet, linoleum and similar compositions, cork carpet and tile, leather or felt impregnated with mastic or other material, are among the principal types. By proper selection it is possible to obtain almost any desired decorative effect or characteristic at reasonable cost.

7

Are stairways ample and safe?

Changes in the character of the occupancy or other circumstances may make it advisable to enlarge or alter stairways. See that handrails are in good condition. Remove piping or other obstructions to proper clearance overhead. If stairs do not have non-slip treads it will be advisable to install them.

8

Do any surfaces require painting?

Note particularly the condition of the old paint as regards checking, blistering, peeling, and other defects, usually traceable to improper preparation of the surface, incorrect application, or the use of material not suited to the service. Important advances in paint technology have been made in recent years whereby painting costs are being lowered and better results obtained.

Aside from affording the protection required to prevent rapid deterioration of surfaces, paint is of supreme importance in improving the appearance of a plant, both inside and out, and in its effect on the lighting. Any efforts made to take full advantage of its possibilities through proper selection and application are certain to be well repaid.

9

Is the lighting system adequate and modern?

Present standards call for considerably higher intensities than were commonly used a few years ago. Also, recent important developments in lamps and reflectors tend to make

SPECIFICATION IN FIRST

FIRST

SPECIFICATION IN

PLANT

LIGHT CONDITIONING—

THE WHITEST WHITE PAINT YOU CAN BUY!

SHERWIN-WILLIAMS SAVE-LITE THE PLANT CONDITIONING PAINT

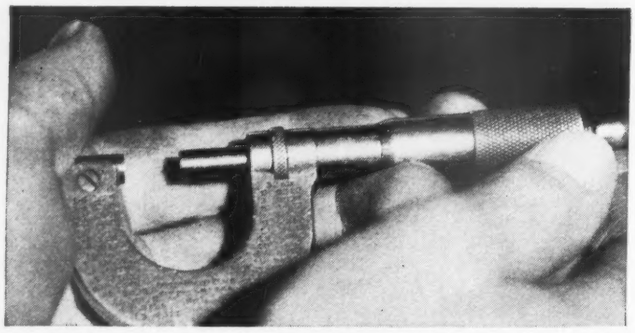
What can a micrometer tell you about Industrial Lighting?

YOU can't measure the light in your plant with a micrometer. But the ease, speed, and accuracy with which micrometer markings can be read very often reveal whether your plant lighting is well diffused for easy seeing or whether it is spotty and glaring.

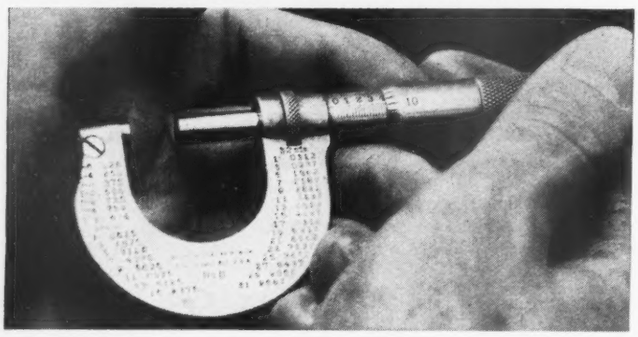
Today, thanks to lighting research, the kind and amounts of light needed for various industrial processes can easily be determined. For example, certain kinds of close seeing, precision work require 50, 100 or more footcandles of light to be done efficiently and with minimum eyestrain. With a General Electric Light Meter, you can measure the light accurately.

In lighting your plant, it is also important to use only good lamp bulbs... such as Edison MAZDA lamps. They give more light at no additional cost for current and they *stay brighter longer.*

For further information, about industrial lighting, write General Electric Company, Dept. 166-F-D, Nela Park, Cleveland, Ohio. Ask for a copy of the new G-E Industrial Bulletin.



• *Polished surfaces, such as micrometers, scales, etc., require well diffused lighting. Reflected glare from a concentrated light source makes it difficult to read the scale of the micrometer in the upper photo. Compare this with the sharpness of the markings in the lower photo which shows the same micrometer lighted by a large-area source.*



USE A G-E LIGHT METER TO MEASURE YOUR PLANT LIGHTING.

A G-E Light Meter measures light as simply as a thermometer measures heat. It tells whether the various departments in your plant are getting enough light for easy seeing. It costs only $11.50.

EDISON MAZDA LAMPS

GENERAL ELECTRIC

They stay brighter longer

any lighting system obsolete that has been in use for any considerable period. These developments include the high-intensity mercury-vapor lamp and fluorescent lamps for general illumination as well as special applications involving color discrimination and decorative lighting. With these new lamps the light output per watt is much higher than was previously obtainable. As a result considerably less heat is dissipated. This matter is of particular importance with air conditioning installations.

To be of much value, a survey of the lighting system should be complete, including the reading of footcandle intensities at workplaces and other areas throughout the plant. Note the voltage at different parts of the system, size of lamps, type and condition of reflectors, spacing and mounting heights of the units. Study of the illumination requirements at points where the visual task is severe should also be made. These and other pertinent data should be checked with the recommendations of reflector and lamp manufacturers and other authorities, as the basis for a sound program of modernization.

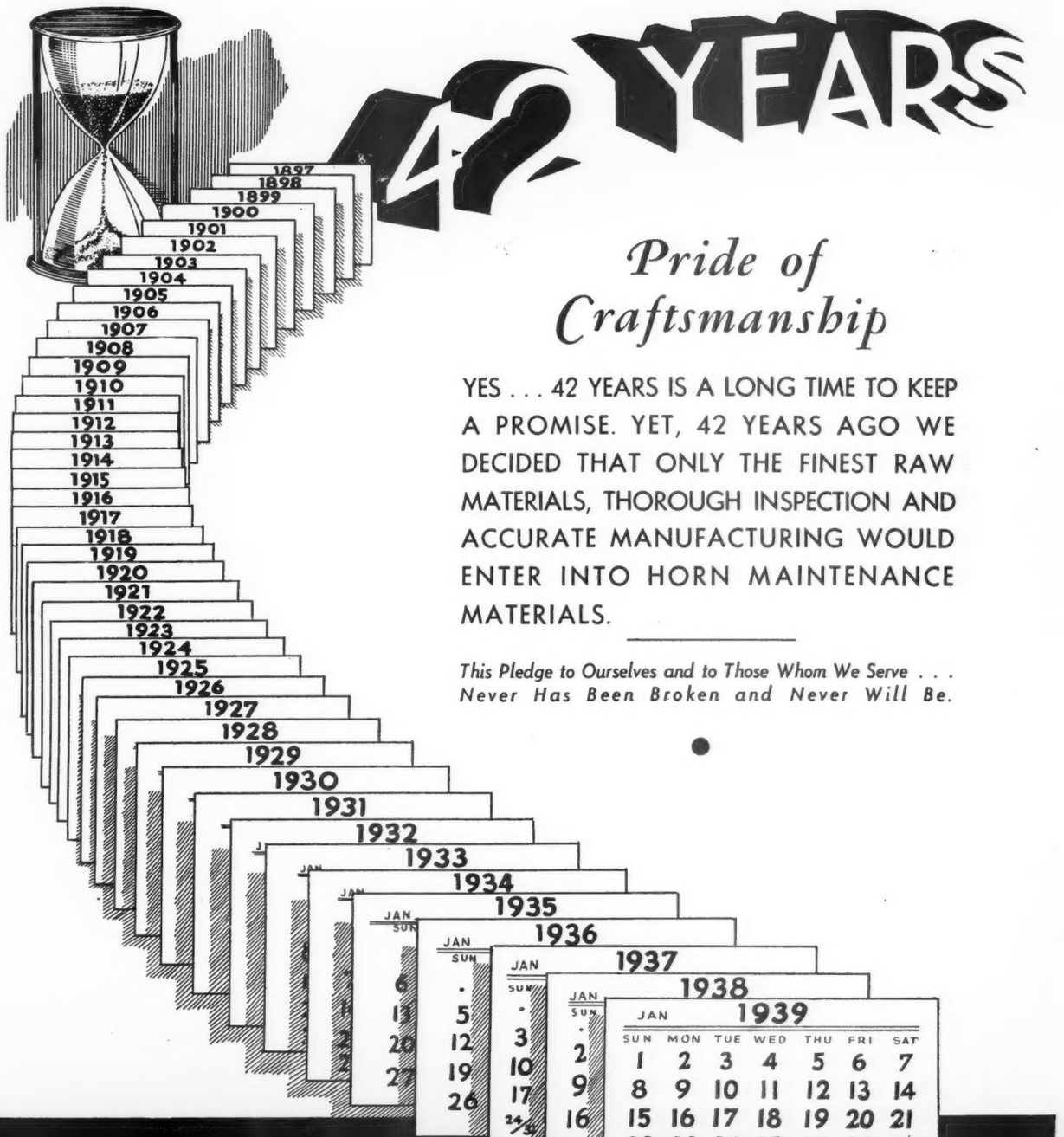
10

Is the heating system effective and economical?

Inspection should include the boiler and all lines, traps, radiating equipment and temperature controls, to determine their condition and adequacy. With hand-fired boilers consider the advisability of using stokers or oil firing. Such change-overs frequently result in worth-while savings.

Types and location of radiating equipment should also be investigated, to determine their suitability. In plants or departments that are not air-conditioned, present practice strongly favors the use of unit heaters for working areas. These are available for floor or ceiling mounting in a wide variety of styles and sizes to meet every industrial requirement. Direct radiation is frequently used in small rooms, such as offices, and in certain other areas. The most suitable type of heating unit for each area must be determined.

Without automatic control, opera-



Pride of Craftsmanship

YES . . . 42 YEARS IS A LONG TIME TO KEEP A PROMISE. YET, 42 YEARS AGO WE DECIDED THAT ONLY THE FINEST RAW MATERIALS, THOROUGH INSPECTION AND ACCURATE MANUFACTURING WOULD ENTER INTO HORN MAINTENANCE MATERIALS.

This Pledge to Ourselves and to Those Whom We Serve . . . Never Has Been Broken and Never Will Be.

A. C. HORN COMPANY

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° Manufacturers of Materials for Building Maintenance and Construction

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ALVEY-FERGUSON
CONVEYOR ENGINEERS
SOLVE ANOTHER PROBLEM

Stators were formerly handled in this department by means of a chain conveyor. Only 11,000 a week was the old production.

Today, with an A-F Belt Work TableSystem giving *endless stream transportation* in the assembly department of this manufacturer of fine motors, 24,000 stators a week are now being conveyed! And protection against scraping the stators is an added feature!

Is *your* material handling system as modern, as economical, as safe, as speedy as you want it to be? If not—ask an A-F engineer for his suggestions to help you speed production and reduce your costs. For free consultation, write today. The Alvey-Ferguson Co., South and Disney Streets, Cincinnati, Ohio.

ALVEY-FERGUSON
SCIENTIFICALLY PLANNED
Conveyors

CONVEYING A-F MACHINERY

New Catalog Just Out!
Write for it TODAY!

tion of the heating system is almost certain to be inefficient and wasteful. Control devices have reached a high degree of perfection. When properly used with suitable radiating equipment they may be relied on to maintain a satisfactorily uniform temperature in any area with minimum waste of heat.

11

Will air conditioning improve products or working conditions?

Close control of temperature and humidity with washing or filtering and forced circulation of the air are indispensable to efficient operation in many plants. They are being adopted in other plants for the incidental advantages which they offer, among them being increased comfort, well-being, and efficiency of workers.

Intensive research and development have done much to reduce the first and operating costs and improve the efficiency of air conditioning equipment. One result of this work has been the development of compact, self-contained units for air-conditioning comparatively small areas. These units are available in a variety of sizes and can be installed anywhere, at reasonable cost.

12

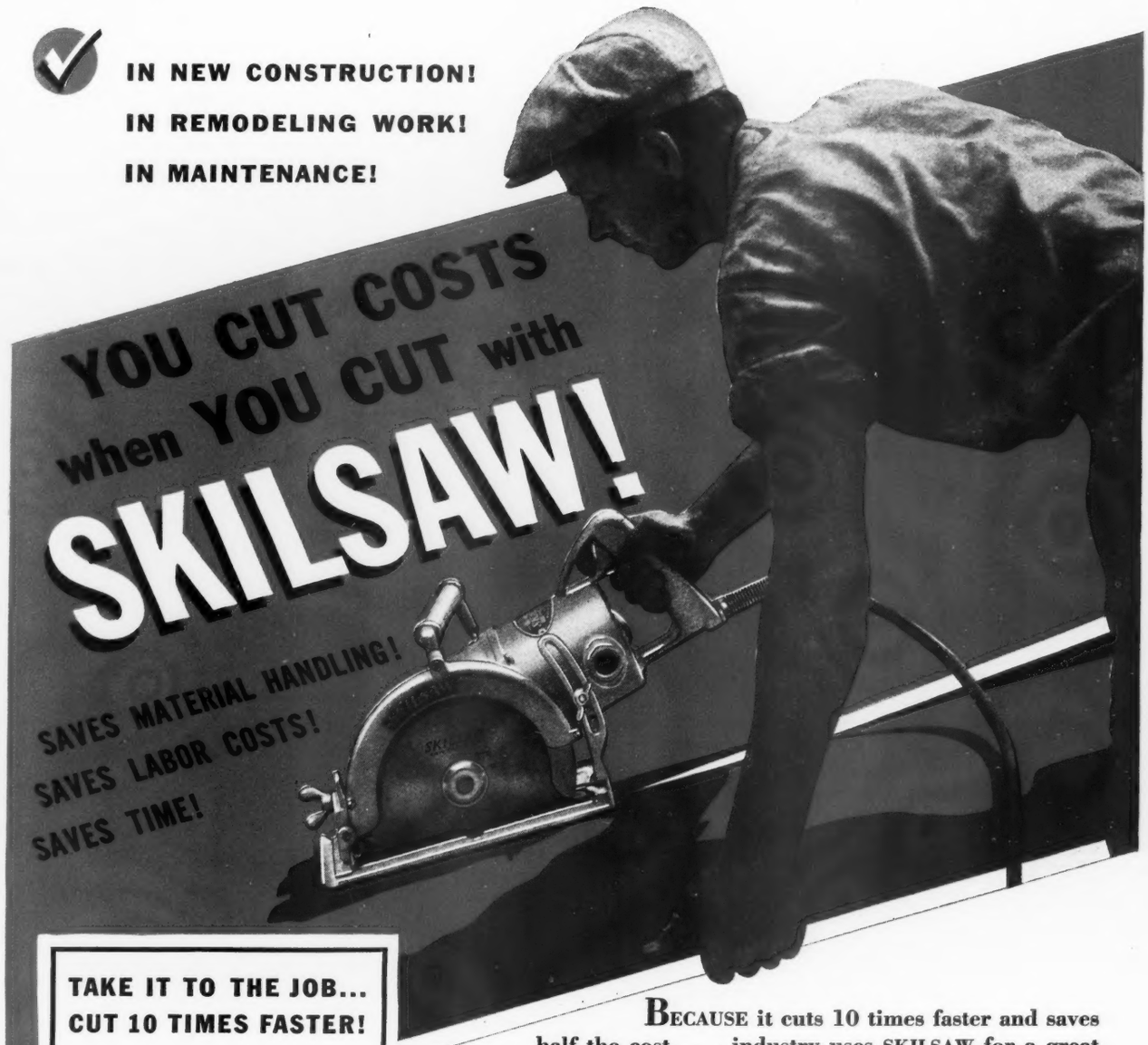
Is there adequate provision for dust and fume removal?

Inspection should determine the condition and adequacy of the equipment used. There is always the chance that changes in processes have altered the amount and character of polluting agents. The importance of minimizing the pollution of air in factories and the development of more effective means of removing objectionable impurities may make it advisable to replace present devices with others of better design.

Even though there may be no definite pollution of the air from the by-products of some process, it is necessary to provide for the removal of heated stale air and the introduction of fresh air. These objectives may be attained in several different

IN NEW CONSTRUCTION!
IN REMODELING WORK!
IN MAINTENANCE!

YOU CUT COSTS when YOU CUT with SKILSAW!



SAVES MATERIAL HANDLING!
SAVES LABOR COSTS!
SAVES TIME!

TAKE IT TO THE JOB... CUT 10 TIMES FASTER!

● Rips out 60 feet of old 3 in. maple flooring in *10 minutes!* This would take 2½ hours with handsaw and crowbar.

● Saves time in sizing lumber. Work can be ganged for greatest speed. Ideal for cutting car bracing lumber.

● Cross-cuts ten 3 x 4 studs in *16 seconds;* rips a 2 x 12 joist in *15 seconds.* Ideal for partitions.

BECAUSE it cuts 10 times faster and saves half the cost . . . industry uses SKILSAW for a great many sawing operations, like cutting out old flooring; bracing and blocking carload shipments; building skids and crates for heavy machines; cutting lead, copper, aluminum, Transite and Masonite. It's the accepted tool in the building industry for rough framing of all wood members.

SKILSAW is the leading electric handsaw because it is built stronger, will do more sawing jobs, has more power in each of its 9 models. Plugs in anywhere, cuts wood, metal, stone and compositions.

SKILSAW, INC.
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214 E. 40th St., New York ● 52 Brookline Ave., Boston ● 1429 Spring Garden, Philadelphia
2124 Main St., Dallas ● 918 Union St., New Orleans ● 1253 South Flower St., Los Angeles
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SKILSAW
PORTABLE ELECTRIC TOOLS
SAVE MONEY IN EVERY INDUSTRY!
· SAWS · DRILLS · BELT SANDERS · DISC SANDERS · GRINDERS · BLOWERS ·

Sold by leading distributors of mine, mill, hardware and contractors' supplies.

Free Book Tells How the Right Fence Can Save You Money—*send for it!*

BURGLARS, marauders and trespassers leave property alone when it's protected with sturdy Cyclone Fence. They know it's hard to get by this tough barrier—and that the getaway is blocked.

Cyclone Fence is strong and stays that way. Its fabric of rust-resisting copper steel wire is further fortified against rust by a heavy coat of galvanizing — applied *after* weaving. Cyclone Fence is made right and erected by factory-trained men. Finest materials and workmanship result in long life. Upkeep is almost negligible.

Good property protection fence increases property values and protects them. Write us for information. Estimates furnished free by our engineers.

Send for our free 32-page book that tells all about fence. Crammed full of illustrations. Shows 14 types — for home, school, playground, business. Tells how to have gates that don't drag—posts that stay straight. Whether you need a few feet of fence or 10 miles of it you need this valuable book.

• • •

Now you can be sure of the quality of fence before *you buy it. Cyclone Fence with the "12M" label has an extra-heavy coat of galvanizing that affords greater rust resistance. It lasts longer*—yet it costs no more. *Be sure that the "12M" label is on the fence you buy.*

CYCLONE FENCE COMPANY
General Offices: Waukegan Ill.
Branches in Principal Cities
Standard Fence Co., Oakland, Calif., *Pacific Coast Division*
United States Steel Products Company, New York, *Export Distributors*

USS
CYCLONE FENCE

CYCLONE FENCE CO.,
Dept. 949, Waukegan, Ill..
Please mail me, without obligation, a copy of "Your Fence—How to Choose It—How to Use It."
I am interested in fencing: ☐ Industrial Property; ☐ Playground; Residence; ☐ Estate; ☐ School.
Approximately .....feet.
Name.....
Addres.....
City..... State.....

UNITED STATES STEEL

ways. The equipment used, should be carefully checked to make sure that it is effective and adequate.

13

Are sanitary facilities up to date?

Increased attention is being paid to the location of toilet, locker and washrooms, and the equipment used in them. Adequate facilities properly located with respect to the areas which they serve will make a real saving in production time for both the men and the company. Fittings and equipment used in these places have been redesigned to make them more attractive and convenient, easier to clean and maintain.

From the standpoint of appearance, ease of cleaning, and low maintenance cost tile walls and floors offer important advantages. However, well-painted plaster walls and good floors make an acceptable substitute. With plenty of light, ample ventilation, and modern fixtures in its toilet, locker and washrooms any plant can do much to belie its years and raise the morale of employees.

A sufficient number of drinking fountains correctly located will also be a good investment. These compact, sanitary units are easily installed and require little attention, but they render a service whose importance must not be overlooked.

14

Is the electrical distribution system adequate and flexible?

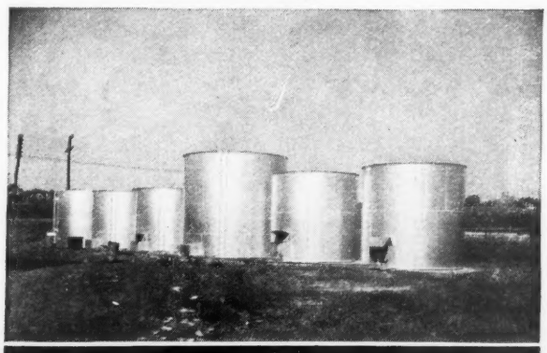
If there have been many changes in the number, size, or location of production machines and the distribution system has not been carefully revamped to keep pace with these changes, portions of it are likely to be overloaded or at least lacking in reserve capacity for future expansion. It is advisable to make a voltage survey, check the power factor, and study the loads and power losses. Check protective devices as to their condition and whether they have adequate interrupting capacity for the conditions.

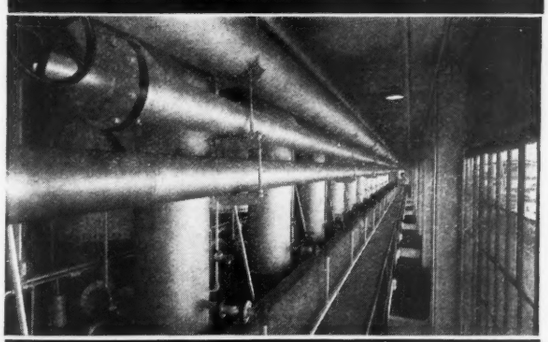
Consider also whether the system is properly sectionalized so that troubles can be localized.

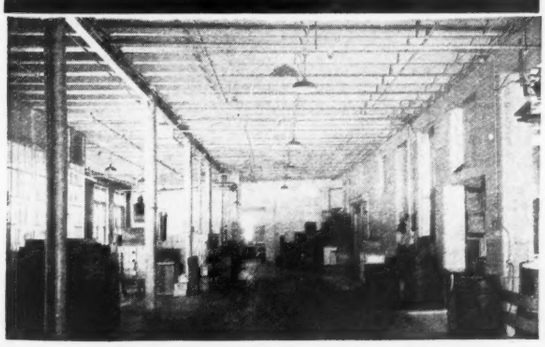
Suitability of the layout can more

WHAT'S YOUR PAINTING PROBLEM?

Presence of Acids, Fumes, Greases? . . Better Reflectivity? . . Quick Drying? . . Temperatures Up to 1000° F.? . . Wet Surfaces? . . Checking? . . Waste In Mixing? . . Costly Left-Overs?







Here's Your Answer!

Thirteen different types of Permite Ready-Mixed Aluminum Paint have been developed to meet the varying needs of industry. One of these specific purpose aluminum paints will solve your painting problems—indoors or outdoors! Here they are, each designed to give a lustrous, long-lasting finish that saves frequent repaintings.

PERMITE

Ready-Mixed Aluminum Paints

- **OUTDOOR** • **INDOOR**
- **WET SURFACE** • **QUICK-DRYING**
- **HIGH HEAT-RESISTING**
- **EQUIPMENT**
- **GENERAL PURPOSE MAINTENANCE**
- **FEDERAL SPECIFICATION**
- **PRODUCT FINISHING — 5 Types**

Permite ends all the bother and waste of mixing aluminum paint on the job. It comes ready-mixed — ready to open and use. Permite won't discolor — won't harden in the can. You can use left-overs next day or next week. Think what this means to you in savings! Think of the savings, too, in the fact that Permite Ready-Mixed Aluminum Paint "leafs" better, gives greater coverage per gallon.

Write direct — or ask your supply house — for full details and prices, stating your needs and application.

ALUMINUM INDUSTRIES, Inc. - CINCINNATI, OHIO

Distributors in Principal Cities

PERMITE READY MIXED ALUMINUM PAINTS

A COMPLETE LINE -- A TYPE FOR EVERY PURPOSE

...BUT is harmless to workers and delicate equipment

Here's a sure-handed weapon for fighting industrial fires. It uses the fastest known extinguishing agent, carbon dioxide snow-and-gas. Kills fire with stop-watch speed.

Yet a LUX extinguisher harms nothing but fire. It is clean, dry . . . won't injure delicate machinery. Lux is non-toxic . . . won't suffocate or hurt workers.

For Electrical, Flammable Liquid Fires

Lux is instantly effective against fires in electrical equipment —the most frequent source of industrial fires. Further, Lux extinguishers easily control dangerous flammable liquid fires.

Briefly, then, Lux is exceptionally effective against industry's worst fire hazards. Prevent costly shutdowns. Get Lux protection now.

Interesting Facts on Fire Protection—FREE

Send for free brochure, "Lux Makes The Difference." Describes Lux Built-In Systems and Lux Portable Extinguishers. Write today.

Walter Kidde & Company

412 West Street, Bloomfield, N. J.

B102

easily be studied by indicating on a floor plan the location of each piece of power-using equipment and the amount of power it requires. Knowing the location and magnitude of the electrical loads it will not be difficult to lay out a new system that will meet all requirements economically. Comparison of the ideal layout with the existing system will show where and how the latter should be changed in order to make it better adapted to the conditions.

If the circuits are of considerable length, study the advisability of raising the distribution voltage.

Need of raising the power factor should also be looked into. It may be done in various ways, including the use of capacitors, and synchronous motors, and will release conductor capacity and improve voltage conditions.

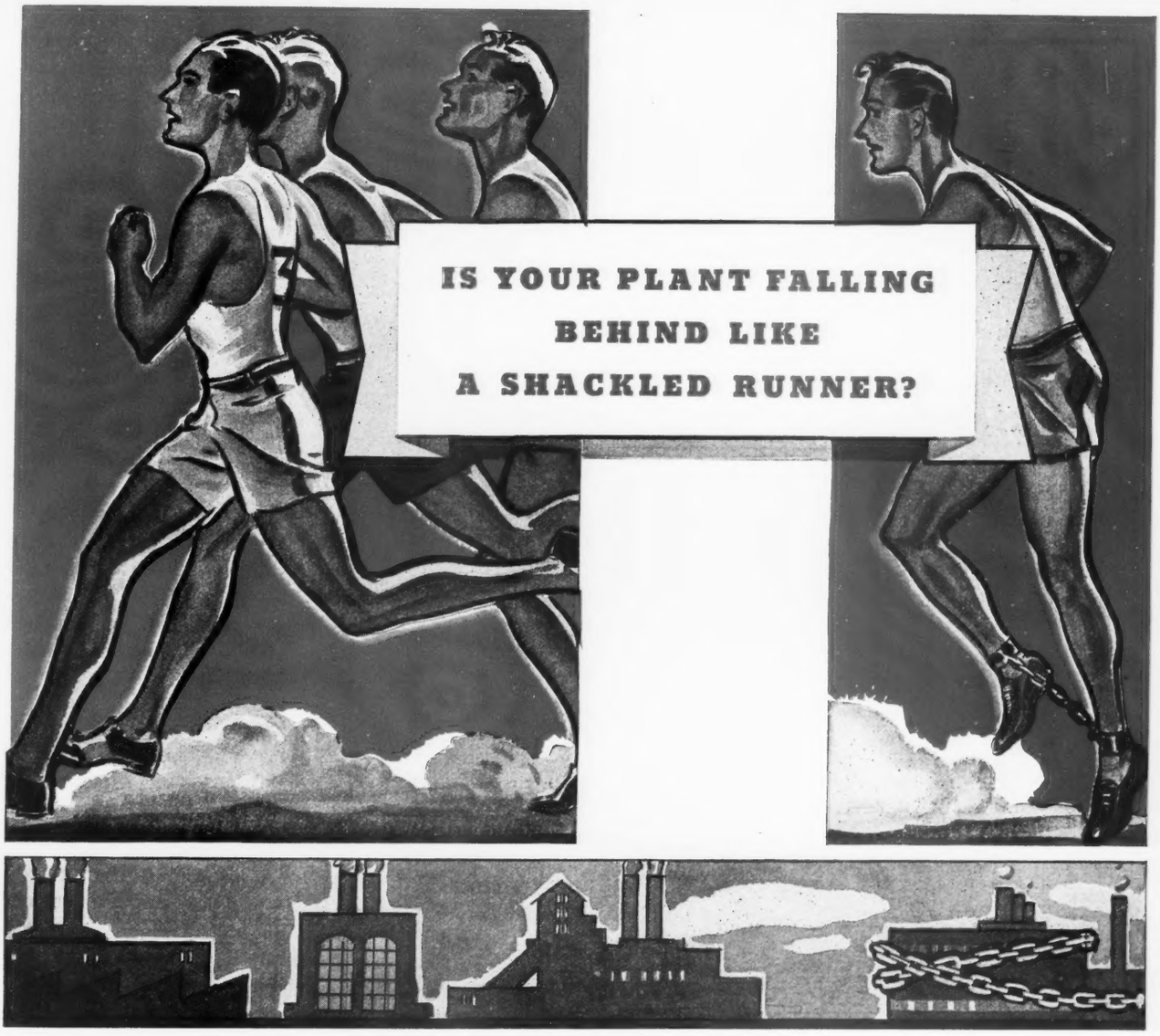
Flexibility of the distribution system in accommodating changes in machine layout is highly important in many plants, and desirable in all. There are available several so-called flexible distribution system which provide these features. They consist of busbars or cables carried in metal duct, with provisions for plugging in or tapping off at almost any desired place. Ease of erection makes it feasible to relocate them as convenience or necessity dictate.

15

Are changes in type or location of power drives advisable?

Choice between group and individual drives involves consideration of several factors, including the initial and operating costs, power requirements of the machines, whether they are operated continuously or intermittently, and the nature of obstructions, if any, presented by building features.

Individual drives can be used under any conditions, but overhead obstructions, excessively high bays, or the necessity of keeping overhead space clear may make it difficult or impossible to use group or lineshaft drives unless they are placed under the floor. When lineshafts are mounted overhead the roof trusses or other supporting structure must



LOOK TO THE WIRING

One of the biggest handicaps a plant can have today is inadequate or old-fashioned wiring. New equipment, new production lines, new sales methods are all to no avail if the wiring will not permit efficient plant operation.

Plan new wiring carefully. Plan to bring existing wiring up-to-date. You will speed production and lower operating costs. In both cases use General Electric Wiring Materials.

The line of G-E Wiring Materials is modern and complete. Whatever material is needed—conduit, building wire or cable, BX, BraidX, outlets, switches, fuses, etc.—there is exactly the right G-E material. It is easy and fast to use too, because G-E materials are designed to be used together. And above all G-E Wiring Materials are quality materials and will give long, dependable service.

For further information about G-E Wiring Materials, see the nearest G-E Merchandise Distributor or write to Section CDW-9104, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

SEE THE G-E "HOUSE OF MAGIC" AT BOTH FAIRS

GENERAL ELECTRIC

Include

VIBRATION CONTROL

IN YOUR
MODERNIZATION PLAN
for

MAXIMUM RESULTS and ECONOMY

Elimination of vibration and noise transmission from industrial machinery accelerates production, reduces maintenance charges and improves personnel efficiency more quickly and economically than any other single improvement available to factory executives and owners.

Leading industrial firms report immediate benefits from Korfund Anti-Vibration Products:

- **Marked increase in operating efficiency.**
- **Machinery speeds increased with safety.**
- **Fewer accidents from employee fatigue.**
- **Elimination of complaints arising from vibration transmission to surroundings.**
- **General improvement in personnel morale.**

KORFUND ANTI-VIBRATION ENGINEERING represents 30 years of active scientific research and practical experience from over 200,000 successful installations covering all ranges of machines regardless of type, size or service.

Information regarding your specific vibration problem will be furnished promptly without obligation

KORFUND
COMPANY, INC.

48-25 THIRTY-SECOND PLACE, LONG ISLAND CITY, NEW YORK

Specialists in VIBRATION CONTROL *for 30 years*

be sufficiently strong and rigid to bear the weight of the equipment and the stresses developed in operation without strain. Before mounting power transmission or other equipment overhead, the proposed support should be checked to make sure that no part of it will be overloaded.

Consider the possibility of putting lineshaft drives in trenches in the floor, particularly in the case of new additions or when extensive building alterations are to be made. Such trenches need not be very large. In one plant they are 24 inches deep and 20 inches wide. When covered with suitable floor plates there will be no interference with trucking or foot traffic.

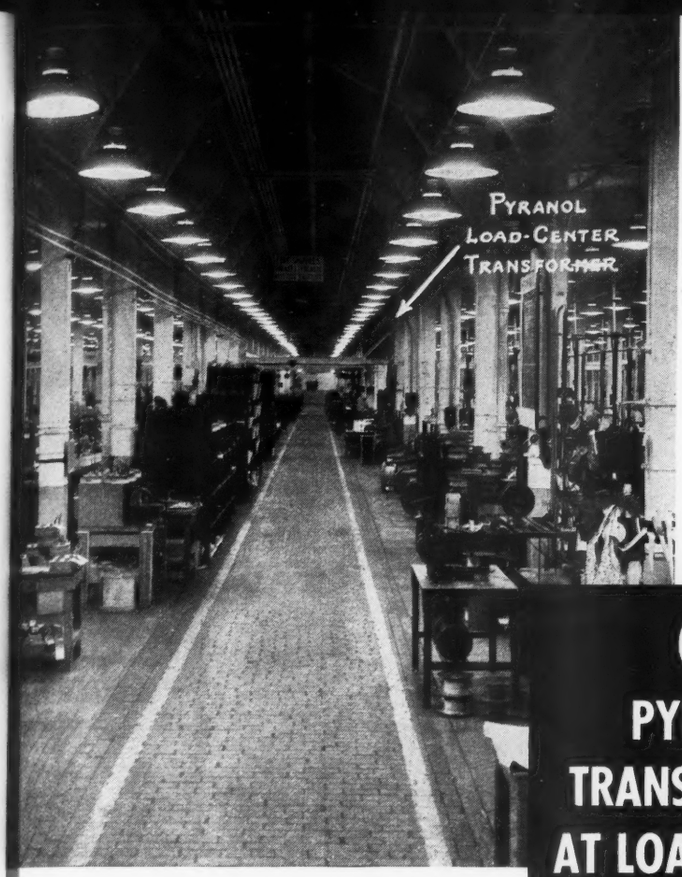
Locating lineshafts in trenches not only frees the overhead space formerly occupied, but makes them more accessible and easier to maintain and lubricate.

16

Is the most effective use made of materials handling equipment?

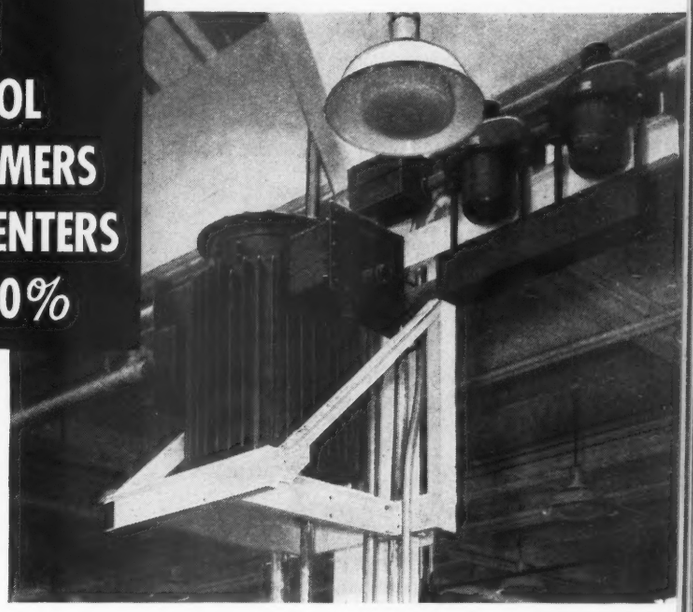
Perfect correlation of manufacturing operations and processes with materials handling equipment is not always easy to attain in any plant. In old buildings, construction features may present obstacles which are difficult to eliminate. Nevertheless, careful selection of materials handling equipment from the standpoint of the service required of it and the conditions under which it must be operated will do much to overcome features of building design that can be changed only at prohibitive cost, if at all. Study of the possibilities and limitations of the kinds of equipment available will show which can best be adapted to the conditions.

It often happens that comparatively slight and inexpensive changes in a building will permit the use of some desirable type of equipment, or increase its effectiveness to a marked degree. For example, widening and straightening aisles, enlarging doorways, or constructing ramps of suitable grade will make possible much wider use of power-driven trucks. Cutting holes in walls or floors may permit the installation of long conveyors on one level, or the use of con-



Thinking of Improving Your *Lighting?*

G-E PYRANOL TRANSFORMERS AT LOAD CENTERS SAVED 40%



NOW you can modernize your lighting circuits—double and triple their capacity—*without installing new secondary copper.* This can mean *savings of up to 40 per cent.*

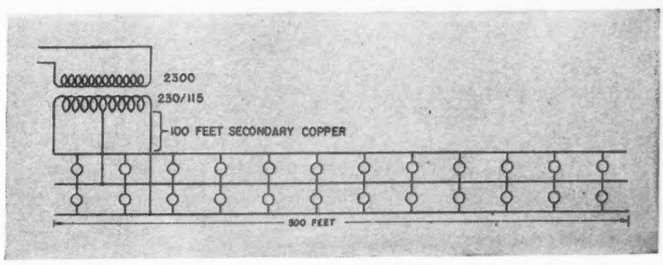
These savings are made possible by the use of Pyranol transformers, a G-E product which has been solving many other problems of power distribution in industrial plants. Because Pyranol, the liquid in these transformers, is noninflammable, they can be installed anywhere in the factory, even on beams up near the ceiling, without a fire-proof enclosing vault.

This means that you can divide existing lighting circuits into several sections, install a small Pyranol transformer at the center of each section, and modernize your lighting at much lower cost.

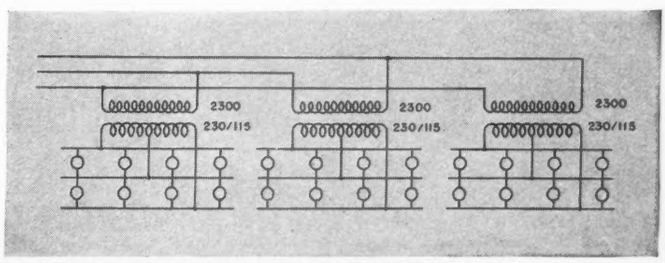
The diagrams on the right graphically depict the way this simple method was used in one industrial plant. Why not investigate it when relighting your next bay, floor, or building—and for new installations? We believe that the facts will lead you to specify Pyranol transformers. Ask your G-E representative for complete details, or write for Bulletin GEA-3180. Address General Electric, Dept. 6—201, Schenectady, New York.

←

To obtain the maximum benefit from modern illumination standards, the level of voltage supply at the lamps should be maintained precisely. One of our new AIRS air-cooled regulators on the secondary of each circuit will free the lighting circuits from voltage fluctuations due to changes in power loads supplied from the same source. These regulators are described in publication GEA-3057



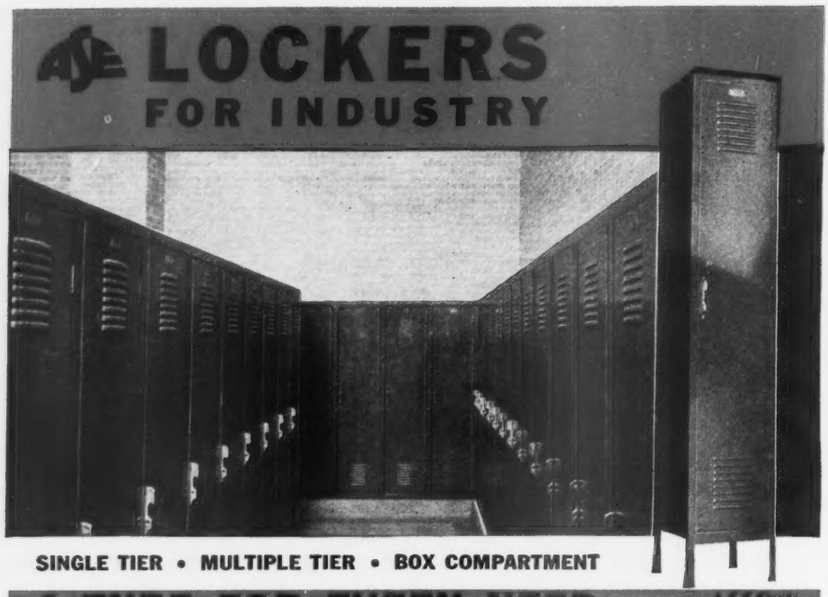
Old method—assume cost as 100%
Complete new secondary copper, with a new transformer in substation outside building



New, low-cost method—cost 60%
Use the existing secondary wiring, dividing it into several sections. Install a new primary feeder, and a small Pyranol transformer in the center of each section

GENERAL ELECTRIC

300-73



SINGLE TIER • MULTIPLE TIER • BOX COMPARTMENT

A TYPE FOR EVERY NEED

A-S-E Single Tier Lockers

A-S-E Double Tier Lockers

The selection of the type of locker best suited for *your* requirements is an easy choice when you have *all* the facts.

The new A-S-E Locker catalog illustrates the many types of A-S-E Lockers being used effectively in hundreds of industrial buildings throughout the country. It describes the features which assure extra years of trouble-free service. Shows how adequate locker accommodations may be obtained *economically* for office or plant installation.

A-S-E Combination Locker

A-S-E Lockers are designed and constructed by an organization with over 26 years of experience in meeting industrial requirements. They are built to withstand hard use—reinforced wherever wear or damage might occur. They have exclusive features which eliminate the maintenance costs frequently encountered with less sturdily constructed lockers.

Let us send you a copy of the new catalog. It will be helpful in determining the most practical type and arrangement for your individual needs. Write for it today; there is no obligation.

WRITE FOR THIS CATALOG...

It contains complete information about lockers for industrial plants and offices.

ALL-STEEL-EQUIP COMPANY
INCORPORATED
404 JOHN STREET • AURORA, ILL.
Also Manufacturers of: A-S-E Stack Units • Stacking Boxes • Filing and Tool Cabinets

Do You Read A Routed Copy?

If you are on a route list to read Factory Management and Maintenance, you probably pass it along without having the chance to read just the article that you would like best. Routed copies have a knack of arriving at inconvenient times—late—and often in poor condition.

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FACTORY MANAGEMENT *and* MAINTENANCE
330 WEST 42ND STREET NEW YORK CITY

veyors, chutes, or other equipment between floors. Strengthening of roof trusses may be all that is required to take advantage of the money-saving possibilities offered by hoists and overhead conveying systems. Suitable bracing of floors may greatly increase storage capacity by permitting stock or materials to be piled higher. Construction of a bridge between buildings at some convenient floor level, to accommodate a conveyor or trucks, may make possible a better layout, or markedly expedite handling operations between departments or buildings.

One large company has recently put in a long tunnel between two of its buildings and by the use of a system of conveyors has greatly reduced the cost and increased the speed of handling.

17

Are there adequate communication facilities?

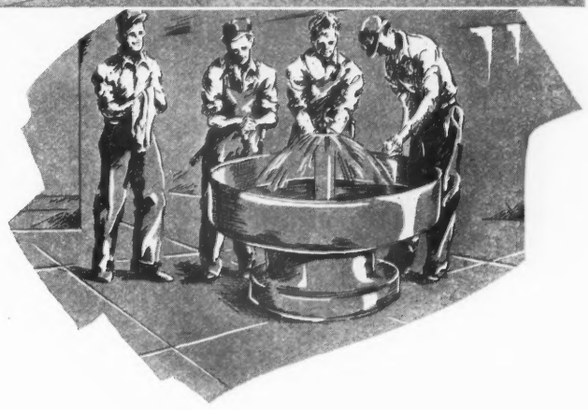
Effective direction and control of production require efficient means of communication among all departments and executives. To meet this need there have been developed a variety of private telephone systems. They range from simple outfits limited to a few stations to automatic or dial-operated systems containing any desired number of stations. One important advantage of any suitable private system is that it relieves the switchboard connected to the city system of the burden of handling interdepartmental traffic, thus speeding up the handling of incoming and outgoing calls.

Paging devices, usually operated from the telephone switchboard, are also coming into wide use because of the ease and rapidity with which persons who have been called on the telephone, while away from their desks, can be located.

Of more recent development are loud-speaker telephone systems. They can be had in a number of combinations and arrangements to suit any condition.

Public address systems are also finding a place in many plants. Suitably located loudspeakers connected to a central board serve to broadcast

A Wet Floor Need Not Be a Slippery Floor



ORDINARY terrazzo would be dangerously slippery in places like these where wet floors cannot be avoided. So in this modern washroom—in this processing room in a factory —terrazzo was made non-slip, even when wet, by using Alundum Aggregate in surfaces. Alundum Aggregate gives additional durability, preventing worn hollows where traffic is concentrated. Does your file contain copies of Catalogs "C" and "D" which give valuable information about Alundum Aggregate for terrazzo floors and stairs and Alundum (C.F.) Aggregate for cement floors?

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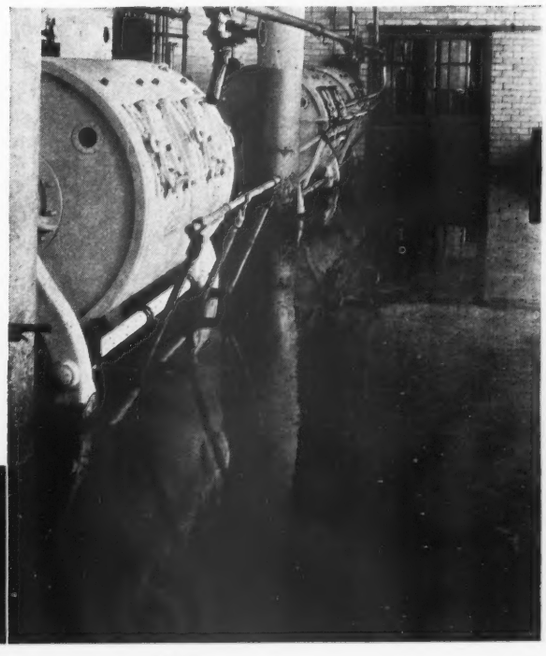
NORTON COMPANY, WORCESTER, MASS.

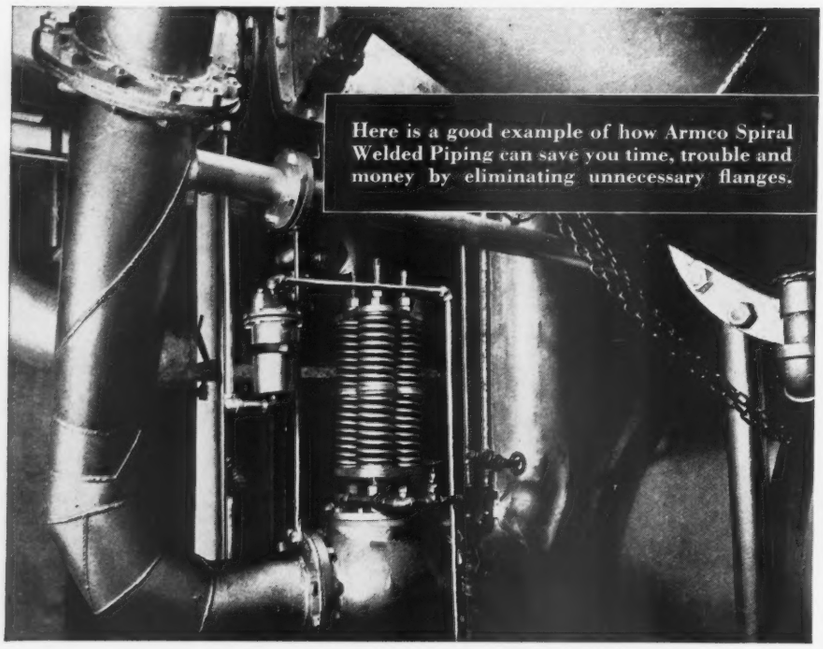
ALUNDUM TILE • TREADS • AGGREGATE



NORTON FLOORS

ALUNDUM TILES—TREADS—AGGREGATES

STREAMLINE
YOUR PIPELINE
.. SAVE TIME AND MONEY


Here is a good example of how Armco Spiral Welded Piping can save you time, trouble and money by eliminating unnecessary flanges.

Note the neat, trim pipe lines in this picture. Unnecessary joints have been eliminated by designing with Armco Spiral Welded Pipe. More than just nice appearance, this means actual saving of time and money. Here's the story . . .

Armco Pipe and fittings are shop-fabricated to your exact specifications. By ordering Armco fittings attached to straight pipe runs, you save two flanges on each bend, avoid excess weight, and lessen the chance of joint leakage. Installation is simplified too. Armco Pipe goes in fast without costly delays. There is less assembly work and the pipe is easily handled in lengths up to 40 feet. You'll also find Armco "Spiral Welded" strong and durable; smooth inside for peak flow capacity. In tight quarters Armco Pipe gives you a more compact installation.

You can design for utmost economy and still meet your exact requirements with Armco Spiral Welded Pipe. Diameters run from 6 to 36 inches; wall thicknesses from $\frac{7}{64}$ to $\frac{1}{2}$-inch. Base metals, coatings and lengths are optional to fit your needs. Let us help you get the most out of that next pipe investment. When you're ready, just mail your drawings and specifications. Meanwhile, ask us to send you our 42-page book full of practical information. The American Rolling Mill Company, 781 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO
SPIRAL WELDED PIPE

musical or other programs, announcements by executives, and so on.

18

Are firefighting equipment and alarm systems in good order?

Inspect carefully to determine condition and whether adequate for the hazards, properly located, and suitably marked. It is important to make sure that changes in the location or character of equipment or processes have not introduced hazards against which the existing fire protective equipment is inadequate.

Notable improvements have been made during recent years in sprinkler and automatic and manually operated alarm systems, extinguishing equipment, and so on. Advisability of replacing equipment now in use with devices of later and better design may well be considered.

19

Are yard structures in good condition?

Inspection should determine the condition of and need for painting or repairs to water tanks, gatehouses, garages, and any other structures. Any buildings or sheds that are no longer used should be torn down, to improve the appearance of the property and reduce fire hazards.

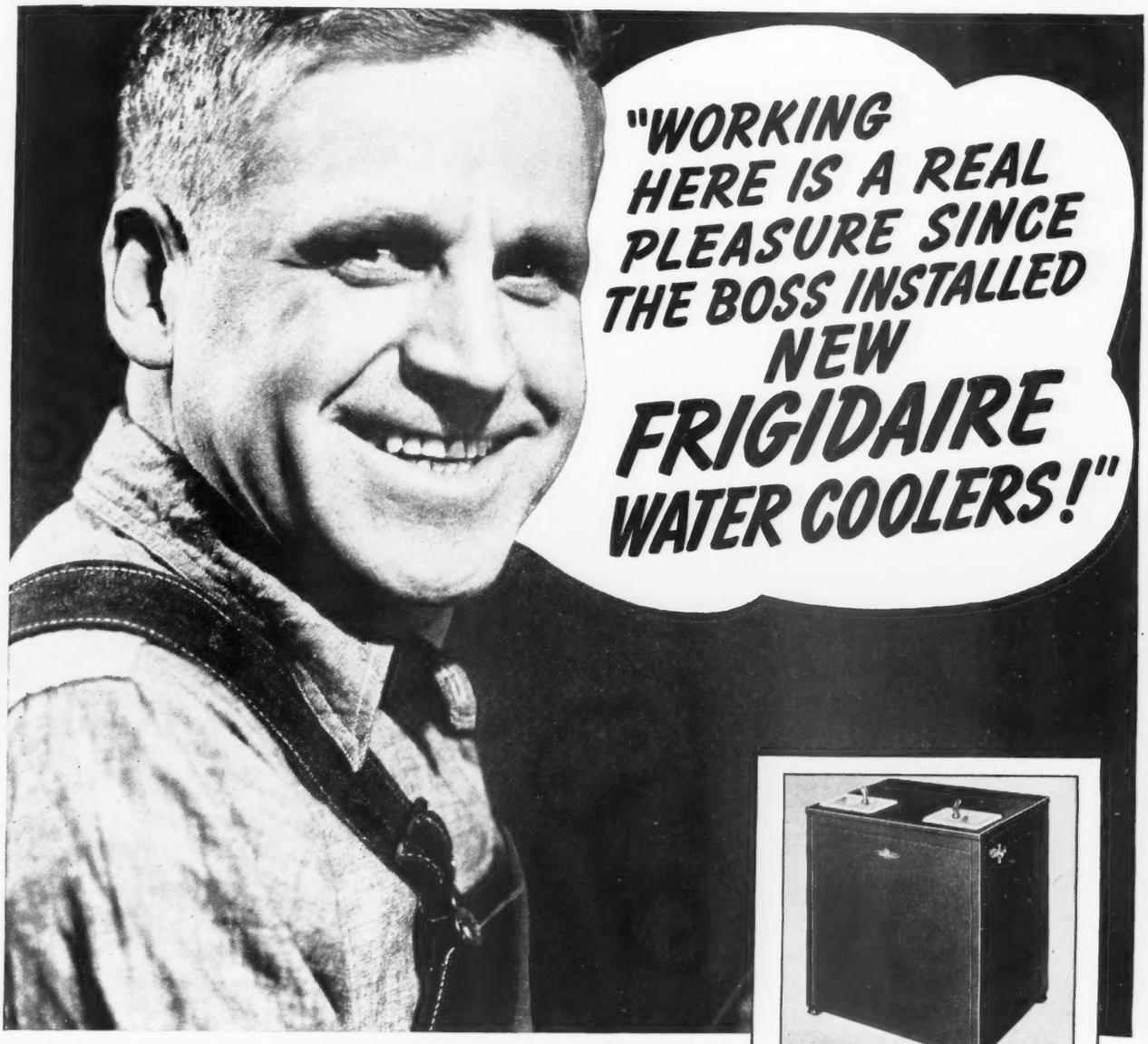
20

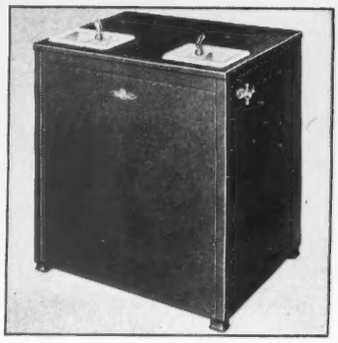
Do yards look attractive and well kept?

Comparatively few dollars spent in suitable landscaping, or even tidying up, will almost invariably pay big returns in improved appearance—an important matter from the standpoint of both the employees and the public.

When unoccupied ground is available, it can be made a profitable investment in good will by turning it into a parking space or athletic field for employees.

If the property is protected by fencing, inspect the latter carefully to determine whether it is in need of repair, painting, or replacement. When fencing is not used, consider the advisability of installing it, to protect the property from intruders and prevent injury to trespassers.





Especially designed to meet unusual usage demands, Frigidaire Industrial Water Cooler Model MI-25 is ideal for steel mills, foundries, etc.

Modern Frigidaire Water Cooling Systems Increase Employee Safety and Efficiency... Build Good Will... Pay For Themselves in Savings

■ Every day, an increasing number of America's leading industrial plants and factories are finding it a wise investment to replace out-of-date water cooling systems with modern Frigidaire equipment. They are finding that it improves employee working conditions, helps safeguard health and safety, increases efficiency, builds good will.

And they are discovering it *profitable* to do so, too! For Frigidaire systems actually *cost less to operate,* besides doing a far superior water cooling job. In almost every instance the savings effected by the installation of modern Frigidaire equipment were great enough to pay replacement cost in a short period of time.

Why not modernize your plant or factory now? You'll not only be acting to save money—but also to guard employee health and safety—step up efficiency—build good will! Get full information about the complete line of Frigidaire industrial and office Water Coolers. Either see the "Water Cooler" section of your Classified Telephone Directory for location of your nearest Frigidaire Dealer, or write: Frigidaire Commercial Division, General Motors Sales Corporation, Dayton, Ohio.

FRIGIDAIRE WATER COOLERS

Made Only By General Motors

The Cheapest, Most Practical Way To Clean Your Plant

•

LOOK WHAT THESE VACUUM CLEANERS WILL DO

First of all, they ***really clean*** because dust and dirt is ***removed,*** not scattered around to resettle and damage equipment, machinery and product. The plant is virtually dust-free.

Invincibles clean all types of floors, from rough concrete to highly finished wood, and will handle practically any kind of dirt and litter except in the presence of water or oil.

Crowded, close quarters are no handicap to Invincible Vacuum Cleaners. Far from it. Invincibles clean wherever brooms can be used and a lot of places where brooms cannot reach.

Overhead cleaning of pipes, beams, walls, etc., become easy operations with Invincibles. Incidentally, with Invincibles on the job, these parts of the plant ***stay clean*** much longer.

Invincibles are invaluable for cleaning bins, shelving, motors, machinery, boiler tops, workbenches, conveyor belts, etc. If desired they may be used as efficient blowers.

Invincibles substantially decrease cleaning costs. One Invincible Operator often does the work of ***three men*** with brushes and brooms and saves an average of $2000 per year in payroll.

Last but not least, Invincibles seem virtually indestructible. Thousands of them have passed their twentieth year of continuous service. Before you say, "Vacuum cleaning is not practical for our plant," *talk to Invincible*.

INVINCIBLE VACUUM CLEANER MFG. CO. ... 440 DAVIS · DOVER, OHIO

What Industry Must Know About Building

In the interest of making available a guide to the many factors that influence design, construction, modernization, and maintenance of industrial plant buildings, we present again the check list that proved so serviceable when first published two years ago.

To Build or Not to Build?

Is it possible to build?

How much money can be taken from cash without crippling capital or ability to borrow?

Will long-term mortgage prevent later business loans?

What is fair appraisal of present property?

Is it necessary to build?

What are volume estimates now and over next ten years?

Can lines be simplified or standardized for increased business without additional capital or floor space?

Will rearrangement, machinery improvement, increased speeds, revised storage, permit more production in present space?

Is it desirable to build?

Will a new plant provide a good backlog of fixed assets for a financial statement, or "good advertising"?

Will employees feel more secure if company owns plant?

Do labor conditions, marketing factors, material supplies, taxation, make another location desirable?

What exactly are the building needs?

What would be the best departmental layouts for most efficient flow of work? (Check for simplicity.)

How much room for expansion is needed in each department?

What are ideal conditions regarding railroad sidings, waterfront, trucking facilities, etc.?

Would outside consulting viewpoint be helpful in rearrangement?

To build or not to build?

Have all pros and cons been listed in parallel columns, for careful comparison? How closely will cash cover the

WHEN YOU THINK OF *Lighting* THINK OF WESTINGHOUSE

Westinghouse Lighted

The driveway leading into Industrial Rayon's new plant is lighted by Westinghouse as effectively as a city thoroughfare.

Above — One of the "walkways" through the Spinning Room showing the arrangement of Westinghouse lighting units.

Below — Plant administrative offices are equipped with Westinghouse Magnalux indirect lighting units.

INSIDE AND OUT

The new eleven and one half million dollar plant of the Industrial Rayon Corp., at Painesville, Ohio, is completely lighted . . . **inside and out** . . . by Westinghouse. This recent example of "undivided responsibility" for the entire lighting project commands particular interest because of its size and because of the specialized character of the installation.

In the three and one half acre Spinning Room illustrated, 3,376 lighting units are installed. Of these, 576 Glassteel Diffusers furnish the general illumination. There are also 480 special all-aluminum Industrial Concentrators to light the lower portion of each machine. Row on row of Angle Reflectors, 1,920 units in all, build up intensity close to the work. The interior of each machine is equipped with special, Vapor-Proof units.

The lighting in this vast room effectively demonstrates the kind and quality of application engineering that is typical of a Westinghouse service which is available to you without charge.

For details on Westinghouse LOCKLITE LINE or HIGH INTENSITY MERCURY lighting equipment, call your nearest Westinghouse Distributor; or address Westinghouse Electric & Mfg. Co., Lighting Division, Edgewater Park, Cleveland, O.

Westinghouse Lighting Equipment

✓ Check this chart and check your losses!

☐ **WASTED MATERIALS** Dust, when of intrinsic value, spells waste if not salvaged

☐ **MACHINERY REPAIRS** Dust is abrasive, produces increased wear and tear in machinery

☐ **SHUT-DOWNS** Dust causes damages which may entail expensive stoppages

☐ **HIGH LIGHTING BILLS** Dust reduces visibility, necessitates higher wattage

☐ **SUB-STANDARD PRODUCTS** Dust impairs the work of precision machines, affects many operations

☐ **REDUCED WORKING EFFICIENCY** Dust lowers morale, slows up the working pace

☐ **EXTRA CLEAN-UP EXPENSE** Dust spreads all through the plant, makes cleaning hard, more frequent

Efficient

DUST CONTROL

Put a stop to the losses that dust causes, when it is not efficiently controlled. Halt the daily raid on your profits.

Not all of the elements of loss which are attributable to dust appear in the chart here. And not all of them, perhaps, apply in your case. But by and large, throughout industry, the losses chargeable to uncontrolled dust are huge.

You are sure to effect significant savings for your company by *efficient* dust control. We stress the "efficient" advisedly, for dust collection systems vary widely in performance, and in cost.

Write for our *Bulletin D81.* It explains dust collection principles clearly, helps you size up your own needs—and is free to any managing executive or operating engineer.

If you have a **SMOKE** problem ask also for *Fly Ash Booklet A 93*

BUELL ENGINEERING COMPANY INC
12 Cedar Street, New York

buell
DUST COLLECTORS

SALES OFFICES IN PRINCIPAL CITIES

ideal? Would expenditures for plant and building make it impossible to break even at 50 per cent of normal volume? Would moving in near future interfere seriously with business?

•

Where to Locate the Plant

What are the fundamental requirements of the section to be chosen?

Is the product dependent upon climate?

Is cheap power required? Reliable power essential?

Do processes or transportation methods require proximity to water? Location in a rail center?

Is type of labor needed found only in certain sections?

Is proximity to certain natural resources necessary?

Does efficient distribution demand proximity to certain markets?

How choose between several more or less equal sections?

Do present connections permit "pulling up stakes"?

Should several smaller branches be established in a number of strategic points?

What is the labor-disputes history of the various sections under consideration?

How does taxation or social legislation affect operations?

What has been the record over past 5 years?

How do real estate and construction costs compare?

How do sections compare in cost of living, and as a desirable place for homes of executives and employees?

What specific location in a given section?

Is plenty of room around plant desirable, making outskirts of a city preferable to congested areas?

How do real estate prices vary over the section?

What part offers best topographical conditions?

What site offers best architectural opportunities?

How will employees get to and from work each day?

•

What Type of Plant to Build

Has enough time been spent on fundamental planning?

Have all layout and process problems been analyzed?

First Choice of Industry!

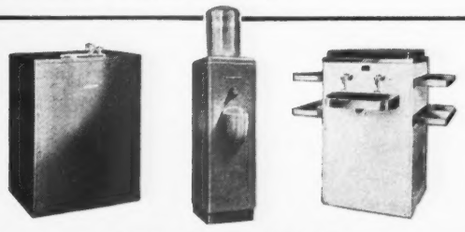
THE IMPOSING list of factories, mills and foundries using General Electric Water Coolers reads like the "Nation's Who's Who in Industry." There are many good reasons for the G-E's great popularity —and why nearly 2,000,000 people now enjoy cool, healthful, refreshing drinking water from G-E Water Coolers every day..

RESEARCH KEEPS G-E YEARS AHEAD

G-E Water Coolers are famous for dependable low-cost operation and long life. The new Stainless Steel Water Reservoir that ends rust, leaks and corrosion is just one of many General Electric advanced features that contribute to *enduring* economy. The G-E delivers the thrifty service you *must have* to make your investment profitable.

CATALOG FREE—ASK FOR IT TODAY

The big, new General Electric Water Cooler Catalog shows the complete G E line of models and all their new features. Ask your G-E Dealer for a free copy or write today to General Electric Company, Commercial Refrigeration Section CT4, Nela Park, Cleveland, Ohio.



MODELS FOR EVERY NEED

GENERAL ELECTRIC
Water Coolers

For such operations as inspection, color matching, sorting, drafting and many others, the fluorescent lamp brings you the qualities of natural daylight in which human vision is at its best. Its cool light permits comfortable, close mounting.

FLUORESCENT FIXTURES

by Goodrich

Offered in three sizes for 18", 24" and 36" fluorescent lamps, these fixtures may be mounted singly, or in parallel or linear rows to answer a wide variety of lighting needs. Finished in permanent porcelain enamel, Goodrich fluorescent fixtures combine an unusually high factor of reflection with proper diffusion of light. See your electrical supplier or write us for catalog sheets.

MEMBER OF R. L. M. STANDARDS INSTITUTE

GOODRICH
ELECTRIC COMPANY
OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES AND FACTORY: 2904 N. OAKLEY AVENUE, CHICAGO, ILL.

B114

Have plants with similar problems been visited?

Should plant be single- or multi-story, or combination?

Single-story advantages—No vertical transportation of heavy or bulky work; economical to build; minimum waste of floor space; efficient use of natural light and ventilation; wide column spacing; easy to adapt to changed methods; simple to expand.

Multi-story advantages—Economical where land is costly or limited; less travel for work-in-process; handling by gravity, vertical conveyors, or elevators.

Separate buildings, or everything under one roof?

Separate buildings more costly to construct; waste floor space; harder to heat and maintain; not very flexible.

Have the following design features been considered?

Are columns as far apart as possible, compatible with practical construction costs?

Do all floors have same working load capacity, to permit rearrangements? Have unnecessarily large load capacities been avoided?

Are story heights sufficient for best natural light and ventilation, and for crane operation?

If auxiliary buildings are planned, are they located so as not to interfere with expansion?

Have construction economies been checked against possible effect on maintenance and production?

Is advantage being taken of attractive exterior (advertising value, prestige, employee morale)?

•

What's What in Plant Design

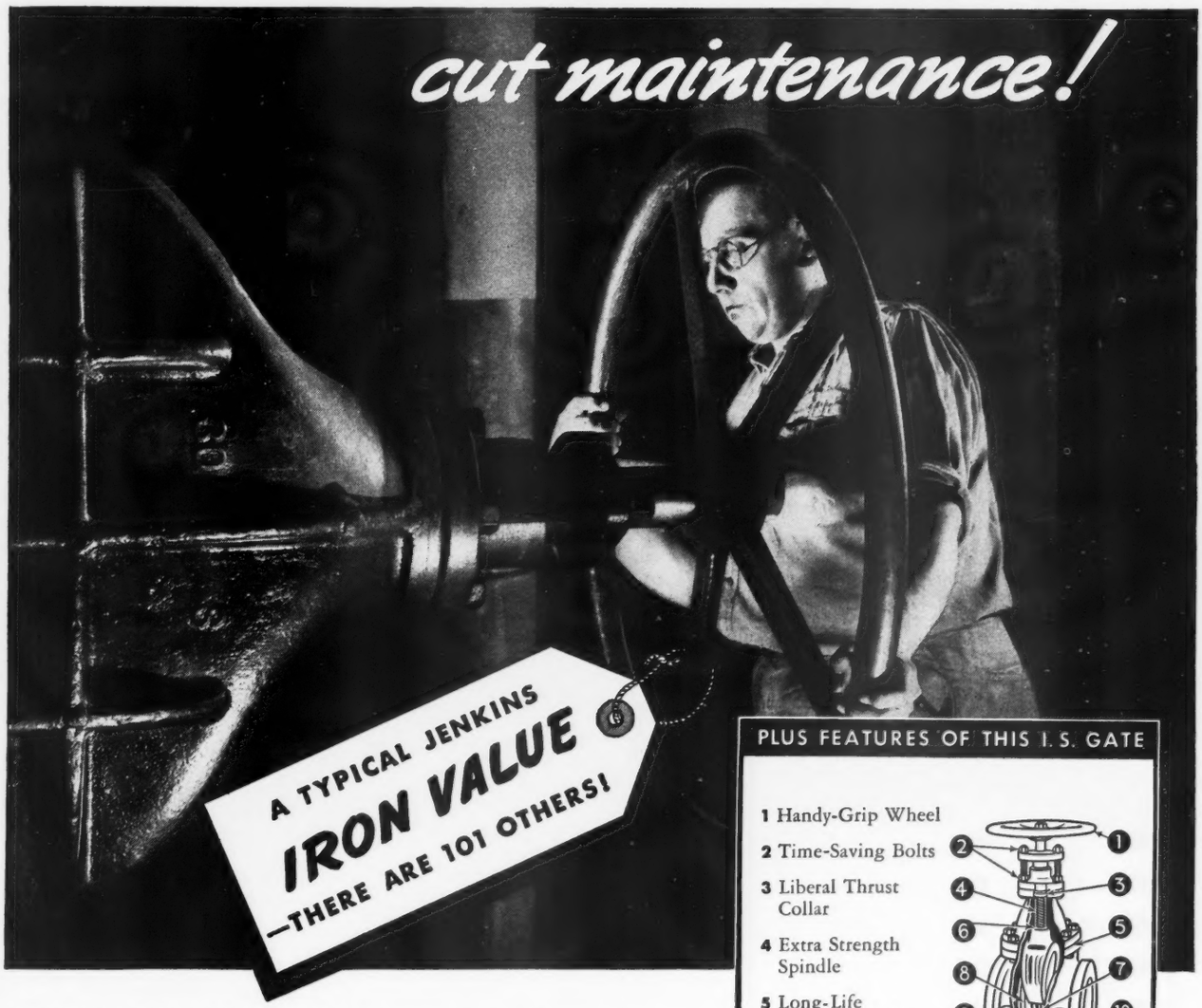
Features of construction

Foundations—Important to provide for plant expansion during initial construction; sometimes better to build additional story than basement; special foundations for heavy equipment desirable.

Walls—Frequently pre-fabricated, highly insulated, light weight; where brick and concrete used, air space and cork, fiber-board, etc. give additional insulation and waterproofing; "sandwich" construction now popular, with metal inside and out, insulation material between; interior partitions now commonly tile or acoustical plasters; where pre-fabricated, inside walls now contain provisions for wiring.

Top-Quality JENKINS iron VALVES

cut maintenance!



THIS 30-inch Jenkins Iron Valve shown, serves on main steam line at New York's famous 40 story Equitable Building.

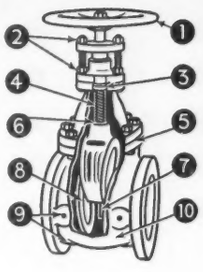
It isn't size alone that makes a valve big—but the way it's made and the way it has performed. Chief Engineer Paulsen's records show that maintenance on this Inside Screw Gate has been practically zero, since it was installed 25 years ago.

When you get Jenkins top-quality, at standard prices, there's no reason why your plant can't have this same iron valve economy. Check over the outstanding plus values we've spotted in the diagram at right. They are typical of the dollars and cents reasons for buying a Jenkins Iron Body Valve every time.

JENKINS BROS., 80 White St., New York, N.Y.; Bridgeport, Conn., Boston, Mass.; Atlanta, Ga.; Philadelphia, Pa.; Chicago, Ill., Houston, Texas, Montreal, Canada; London, England

1864 TRADE JENKINS MARK 1939
DIAMOND Jenkins Bros ANNIVERSARY

PLUS FEATURES OF THIS I. S. GATE



1 Handy-Grip Wheel
2 Time-Saving Bolts
3 Liberal Thrust Collar
4 Extra Strength Spindle
5 Long-Life Asbestos Gasket
6 Bronze Wedge-Bushing
7 Self-Aligning Wedge Guides
8 Renewable Bronze Seat Rings
9 Six Convenient Bosses
10 Iron *Exceeds* A. S. T. M. Standards

Guide to Figure Numbers of Jenkins Inside Screw Iron Body Gate Valves

PRESSURE	SOLID WEDGE		DOUBLE DISC	
	SCW.	FLG.	SCW.	FLG.
125 Lbs. W.S.P.	325	326	872	873
175 Lbs. W.S.P.	251	255	—	—
250 Lbs. W.S.P.	203A	203	876	877

KINNEAR ROLLING DOORS

I like the way those Kinnear Doors open up out of the way—and stay put! And push button control sure is handy.

WORKMAN

There's no time lost in opening and closing service doors around here, since we put in Kinnear Motor Operated Rolling Doors.

SUPERINTENDENT

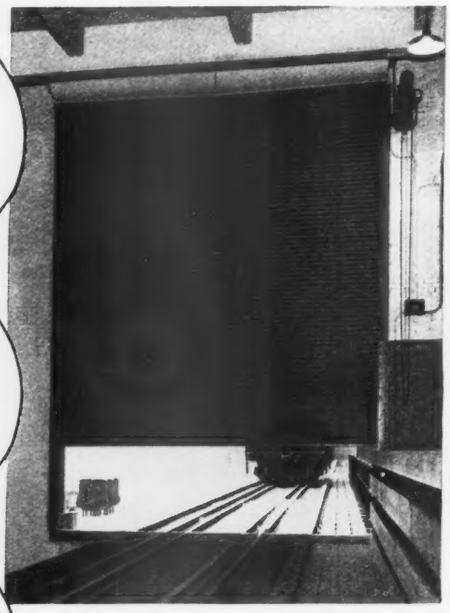
We find we get more value per door dollar with "Kinnears" because they save space, work faster and smoother, and last longer.

PURCHASING AGENT

Door operating and maintenance costs became an insignificant item after we installed Kinnear Rolling Doors.

MANAGER

Let us send you the new catalog of valuable information on door problems and how they can be solved the Kinnear way. Write today!



No wonder Kinnear Rolling Doors get all around approval! They operate with *maximum* efficiency in the *minimum* amount of space—opening upward on a vertical plane, easily and smoothly, and coiling compactly above the opening. They provide the durability of all-steel, plus its protection against fire, weather, intrusion and damage. They save space, time and effort, and cut installation, operation and maintenance costs. Kinnear Rolling Doors are made to fit any opening, can be equipped for motor, mechanical, or manual operation, and can be installed economically in any building, old or new.

KINNEAR ROLLING GRILLES

An impassable, foolproof guard against intrusion and burglary! Provides the all-steel strength and easy, upward operation of Kinnear Rolling Doors, yet does not obstruct light, air, or vision. Coils out of sight above the opening when not in use, but can be lowered and locked securely in place in a few seconds. Built any size, and in various metals, for either manual or mechanical operation, the Kinnear Rolling Grille is adaptable to any doorway or passageway where thorough protection is needed. Ideal for use with Kinnear Rolling Doors. Let us send you complete information. Write today.

THE KINNEAR MANUFACTURING CO.

1540-60 Fields Ave. **Columbus, Ohio**

OFFICES AND AGENTS IN ALL PRINCIPAL CITIES

Floors—Should not be judged by first cost; must sustain loads, resist acids, oils, etc. where used; must not overly fatigue employees; concrete floors in general use for single-story plants and ground floors, low in first cost, wear well if properly finished, but not very comfortable, and repairs relatively expensive; creosoted blocks on concrete base easy on employees, wear well, but not recommended where water or solvent oils prevalent; clear blocks or blocks treated with colorless oil, dovetailed into boards splined together and set in concrete base, satisfactory as regards trucking, resilience, cleanliness; asphaltic mastic floors for acid conditions; mastic floors also available in precast blocks to set in concrete; vitrified paving brick in use around furnaces where traffic and heat are excessive; cast-iron plates imbedded in concrete used where traffic exceptionally heavy.

Roofs—Insulating qualities now carefully considered; metal decks in growing use because of non-combustibility, light weight, relatively low first cost, but require insulating covering; precast cement tile now available in 5- to 8-ft. lengths; poured-in-place concrete roofs for many multi-story buildings because fireproof, but today steel frame with lighter roofing material more common; gypsum tile used frequently but not where high temperatures cause calcining or where moisture severe; corrugated-iron, pitched roofs good where heat loss no consideration; corrugated steel or aluminum sheets with asbestos felt and asphalt coating popular for sloping roofs because long life, low maintenance; cast-iron plate perhaps most permanent sloping roof for adverse conditions, but the initial cost is high.

Trends in design

Welded construction — Increasingly applied in last 10 years; light weight; facilitates construction; rigidity eliminates vibration where moving loads carried; welded frames give wide, unobstructed spans; welding permits curves or other departures from usual designs.

Insulation, isolation, acoustic treatment—Insulation materials of many types available, which are also fire-, water-, vermin-proof; to reduce building vibrations, mechanical equipment now isolated with special foundations, plastic joints, shock-absorbing substances; fatigue-producing noises eliminated with acoustical materials.

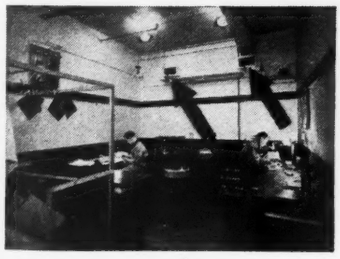
Windowless buildings—Use increasing; give definite control of light, atmosphere, working conditions; some operating costs higher, but mainte-

BETTER PRODUCTION

IN EVERY DEPARTMENT

Carrier
Air Conditioning

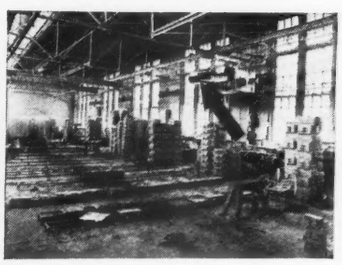
Dehumidification or Humidification—
Air Cleansing or Ventilation—
Cooling or Heating, Economically!



IN THE LABORATORY—there is no guess work about atmospheric conditions with Carrier Air Conditioning. For example, in testing laboratory of Behr-Manning sand paper plant, Watervliet, N. Y., humidity is kept at exactly 50%—temperature at exactly 70 degrees F. Winter and Summer by Carrier Equipment.

IN THE OFFICE—Carrier cool comfort in Summer, healthful heating in Winter keeps efficiency UP, employee absence from illness DOWN. This attractive Carrier air conditioned executive office of the Hammermill Paper Co., Erie, Pa., is kept fresh and clean, free from outside noise and dirt year 'round.

IN THE DRAFTING ROOM—Carrier Air Conditioning means better work, no time lost because of shut-downs in hot weather. Draftsmen at Carrier Air Conditioned Greer Mfg. Co., Cambridge, Mass., report less damage to valuable drawings and plans from outside dirt and dust, and from perspiring hands and arms.



IN THE FOUNDRY—or anywhere in the plant there is quick heat in the morning, healthful warmth all day when Carrier Heat Diffusers are on the job. Carrier Heat Diffusers provide economical heating for 18,600 sq. ft. of floor space in hard-to-heat foundry of Hays Manufacturing Co., Erie, Pa.

IN THE PLANT—production goes up with Carrier Air Conditioning. This New England manufacturer increased production 100-200%, depending on the size of the article. All through accurate Carrier control of humidity and temperature—and through positive ventilation. In other plants Carrier Centrifugal Refrigeration cuts cooling costs as much as $25,000 per year!

Carrier Fills EVERY Air Conditioning Need

● No matter what product you make, Carrier, with its wealth of experience gained through serving 200 or more industries, is well qualified to help you make it more efficiently and more economically. In a Southern tin plate mill, for example, Carrier equipment prevents costly condensation. In many leading candy companies, chocolates are made all year 'round—even on the hottest summer days. Again, a famous auto manufacturer cools rolls in the making of rubber compounds. A New England manufacturer avoids office shutdowns on torrid summer days. And these are just a few of the thousands of Carrier installations throughout 99 countries of the world that are helping manufacturers meet production schedules, today.

For 37 years Carrier has been working with manufacturers —helping to solve their problems. Call your local Carrier representative today. Ask him how Carrier can assist you. If you prefer, mail coupon below for latest descriptive booklets —no obligation.

CARRIER CORPORATION, Syracuse, N. Y., Desk D8
In Canada, Box 1050, Station C, Toronto

Send me information about Carrier Air Conditioning for ☐ processing; ☐ laboratories; ☐ offices; ☐ Carrier space heating; ☐ Carrier refrigeration.

Name.....

Company.....

Address.....

HEAT-FAG is a reality — an unseen but actual force which costs industry thousands of dollars every time the thermometer climbs. Hot days and heavy work make men sweat — and unless the salt that's sweated out of their bodies is replaced, Heat-Fag takes its toll, production sags, and profits suffer. These facts are known by medical men everywhere — and by safety directors, executives and superintendents of leading plants.

Protect Workers Against HEAT-FAG

In hundreds of the nation's leading plants, Morton's Salt Tablets are at every drinking fountain. These handy tablets, taken with a drink of water, represent the most convenient and easiest way to keep the amount of salt in the body at just the proper balance intended by nature.

MORTON'S SALT TABLETS
Dissolve in 50 Seconds

They are easy to take... they dissolve quickly. Only the purest and most highly refined salt is used!

MORTON'S DISPENSER — Sanitary, Economical, Convenient

This modern dispenser — and Morton's Salt Tablets — represent the most efficient and sanitary method yet perfected to supply salt to employes. A single push of the lever at the base dispenses one tablet at a time.

Install Morton's Dispensers and Salt Tablets in your plant now. Place your order today. Anticipate the hot days ahead. Remember — a small investment now will bring back big returns when Heat-Fag invades your plant. Shipments will be made promptly — prepaid.

Write for folder —"Heat-Fag"

MORTON SALT COMPANY
CHICAGO, ILLINOIS

nance reduced, employee efficiency and health improved.

Plant services

Locker, washroom, first-aid—Well-lighted, well-equipped, conveniently placed washrooms standard practice; small locker and wash-up stations, for minimum walking, supplanting central facilities in some plants.

Lighting—Sidewall sash to full-ceiling height now produces maximum daylight efficiency; sawtooth roof construction widely favored for daylighting; larger glass sizes used today; glass brick construction, without windows, a modern development; artificial lighting generally of higher intensities today; combination of mercury units with Mazda lamps gives desired wave lengths; sodium lights now in limited use, usually for close inspection work; indirect lighting, or combination of direct and indirect, in growing use; more attention given today to painting as aid to illumination.

o

When You Air Condition

Why air condition?

Do natural conditions entail appreciable spoilage or depreciation of products? Would improved working conditions justify conditioning for comfort?

What general class of equipment?

Important factors—What would be ideal temperature, cleanliness, humidity? How close must control be? Are requirements year-round or seasonal? For how much of the plant? Would partial system (humidification, no refrigeration, air cleansing) suffice?

Two general types—Central equipment with distributing ducts, for large year-round requirements and close control; unitary equipment, in standard sizes, for small requirements, not very close control.

How will air conditioning affect building plans?

General plans—Locate central equipment for minimum duct runs, allow enough room so that equipment may be easily serviced.

Wall construction—Size and operation of equipment reduced by insulation, wall sealing, and by special window and wall construction to eliminate leakage (glass brick effective); condensation (severe where relative humidity 50 per cent or more) reduced by arrangement of steam pipes, or by blast

IT STARTS WHITER...IT STAYS WHITER

DURING the past few years, modern chemistry has made sensational paint-discoveries.

In the foreground of these new paints is the sensational DULUX Mill White . . . the brilliantly white finish that keeps its whiteness an amazingly long time.

DULUX is a hard, tough finish as smooth and washable as tile. It can stand severe punishment. It does not readily chip, crack or peel. DULUX, because of its smooth, porcelain-like surface, stays cleaner. It is not affected by sweating caused by high humidity on walls and ceilings. It is already setting completely new standards of economy in many plants because it makes repaintings few and far between.

Send in the coupon below for full information about how you can get better paint protection for less money.

SEND FOR FREE BOOKLET

DU PONT **DULUX** MILL WHITE
REG. U.S. PAT. OFF.

Starts Whiter—Stays Whiter

E. I. du Pont de Nemours & Co., Inc. Dept. DB
Finishes Division, Wilmington, Delaware

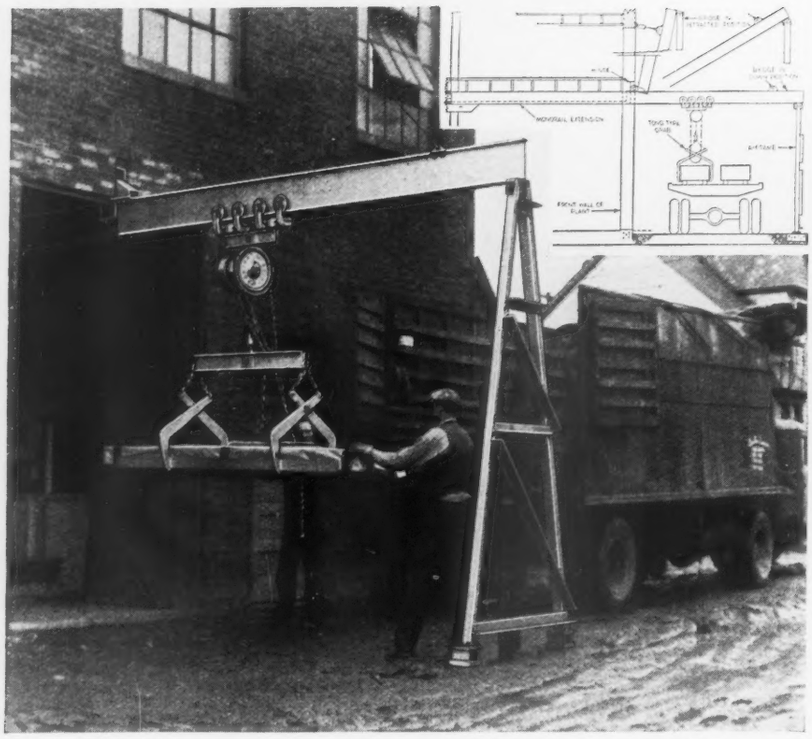
Please see that I get complete information about DULUX Mill White—and your new booklet.

Name.....

Address.....

City.....State.....

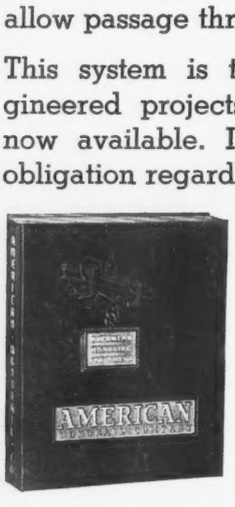
Retractible Crane cuts handling costs!



In four months this simple MonoRail system saved $150.00 in handling costs. Steel, formerly unloaded sheet by sheet, is now transferred from delivery trucks to storage in 3-ton bundles. Handling labor was greatly reduced, while damage to metal was eliminated.

When not in use, the crane shown in the illustration above is drawn up, over the doorway, against the building to allow passage through driveway.

This system is typical of the hundreds of specially engineered projects illustrated in a new 254 page catalog now available. It represents the service available at no obligation regardless of the size of project.



Let an American MonoRail engineer explain the possibilities of an overhead handling system in your plant.

A 254 page book used as a technical reference for all data covering MonoRail Equipment will be sent on letterhead request.

AMERICAN MONORAIL CO.

13114 Athens Ave., Cleveland, O.

of air at walls; ideal wall is fireproof, vapor-proof, heatproof.

Roof construction—Should be insulated with equivalent of 1- or 2-in. cork; special heating system or heated air space required where relative humidity is to be around 90 per cent; in general, sawtooth roofs best for air-conditioned factories.

What does air conditioning cost?

Costs depend on closeness of control, variance from outside conditions, amount of productive equipment (which gives off heat); example of operating-cost ranges, $0.60 to $1.50 per sq. ft. in single-story mills with equipment ranging from 0.8 to 4 hp. per 100 sq. ft.

•

Heat and Ventilation

Are heat and ventilation "in the plans"?

Is space adequate for boiler plant, and for fuel storage and delivery? Do floors need pipe trenches? Have radiators, fans, ducts, been considered in machine placements? Are partitions insulated where necessary?

What type of heating system?

Important factors—Time allowed for reaching required temperatures; heating needs of all departments; outdoor temperatures; winds; building materials, configurations; heat emitted by people, machines, lights.

Heat sources—(1) Fan heater units: direct heat where desired; produce rapid air movement; flexible; economical piping; easily controlled. (2) Radiators: no moving parts; noiseless.

Heating medium—Steam most common today.

Piping system—Maximum condensate should be returned; two-pipe vacuum systems most common today.

Control—(1) Zone system divides radiation into groups controlled separately from one point. (2) Whole system controlled either by regulating supply of steam or by regulating vacuum.

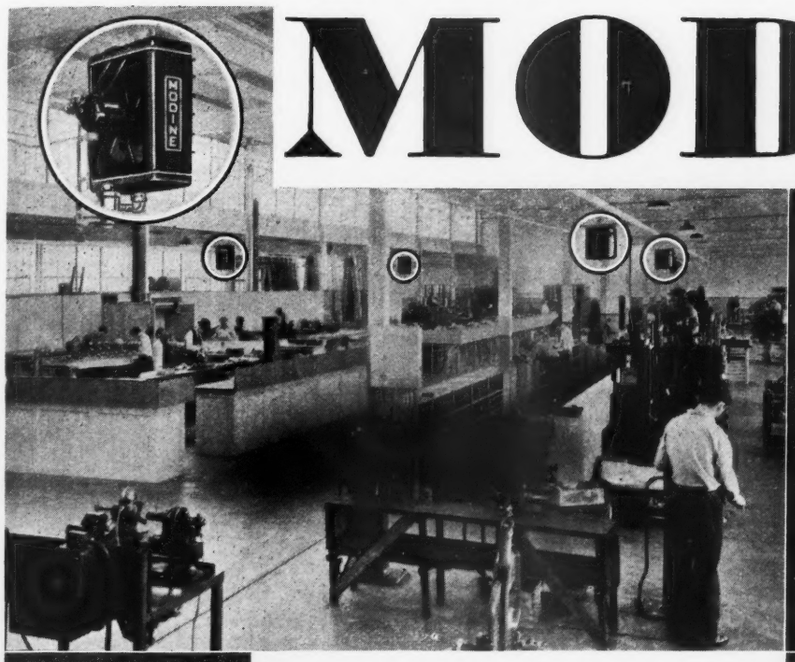
Boiler plant—Size and number of boilers should suit light and heavy loads; ruggedness and durability important; adequate space for maintenance and ventilation, and for expansion vital; study reclamation of heat.

Ventilation

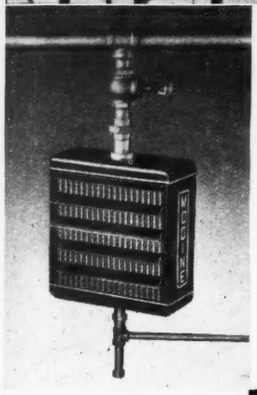
Do operations produce hot air, dust, fumes, etc.?

How often shall air changes be

Go MODERN with MODINE



..the UNIT HEATER that protects production and profits!



BRING YOUR PLANT UP TO DATE

Modernized heating--with Modine Unit Heaters—means not only sufficient heating, but a more logical method of heating that improves processes . . . increases comfort and per-man production . . . protects profits against today's rising costs. • Whether you are modernizing your present plant or building a new one—Modines will provide greater heating efficiency at lower costs. • Even on the coldest mornings, or after week-end shut-downs, Modines give you heat without waiting for "warm-up." From the overhead units heat is directed downward and diffused over floors and working zones. No chilly spots anywhere — comfortable even temperatures everywhere.

In offices, as well as in factories, laboratories and warehouses, Modine Unit Heaters provide maximum heating comfort at minimum cost.

MODINES SAVE SPACE—COST LESS TO INSTALL

Suspended directly from the steam line, a *patented feature,* Modines take up no floor or wall space. Because no hangers are needed, material costs are less; installation is made in quicker time, with less labor. Actual saving is from $3 to $8 depending upon size of unit, number to be installed, etc.

INLET AND OUTLET ARE SOLID BRONZE CASTINGS
TOP AND BOTTOM TANKS ARE IRON PIPE SIZE SOLID COPPER
RED BRASS TUBES
COPPER FINS
EXPANSION BEND

THE MODINE CONDENSER IS ALL-COPPER

Steam - carrying passages, cylindrical for excess strength, cannot leak under high pressures or temperatures. Metallic bonding prevents possibility of reduction of heat transfer from tubes to fins.

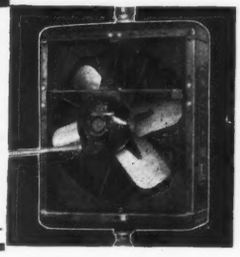
ONLY MODINE HAS VELOCITY GENERATORS

to direct and control air stream leaving unit . . . giving greater heat throw without increasing power requirements.

SAVE 25% AND MORE IN FUEL COSTS ALONE. Modines deliver heat only *where* it is needed. Unlike ordinary radiation, no heat is wasted in overheating wall and ceiling areas. And Modines deliver heat only when it is wanted. Individually controllable . . . thermostatically or manually . . . heat is turned off when desired temperature is reached. No heat or fuel is ever wasted. That's why Modines have effected consistent fuel savings of from 15 to 25 per cent and more wherever they have replaced direct radiation for heating and process drying.

GET THIS FREE BOOK

Whether you are modernizing or building a new factory, office, laboratory or warehouse building—investigate the Modine method of industrial heating. *Get Catalog 138.*



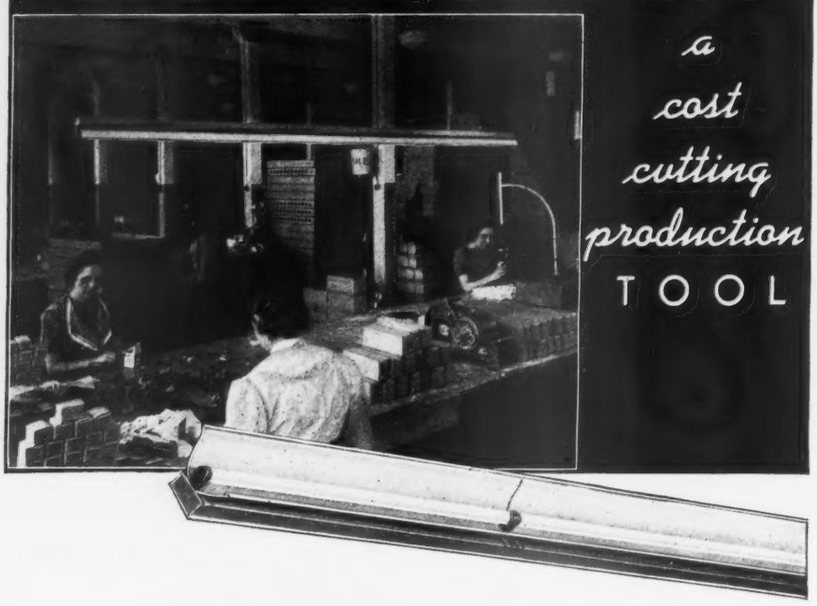
MODINE MANUFACTURING COMPANY

1730 Racine St. **Racine, Wisconsin**

HEATING, COOLING, AIR CONDITIONING EQUIPMENT FOR INDUSTRIAL, COMMERCIAL AND RESIDENTIAL APPLICATIONS

Sold through heating contractors and recognized wholesalers

LIGHT *becomes* *a cost cutting production* TOOL



with WIREMOLD

FLUORESCENT STRIP

FLUORESCENT Lighting is being used more and more as a direct aid to production efficiency.

High intensity, without glare, heat or shadows, makes for increased accuracy, faster production, fewer rejections.

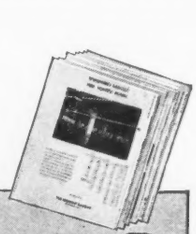
Wiremold Fluorescent Strip, Reflectors and Fittings present one of the easiest and most economical methods of bringing the full benefits of modern cost-cutting Fluorescent Lighting to your production line, inspection department, drafting room and other vital places where better light and better sight mean better work, and lower costs.

Wiremold methods and equipment are simple, flexible to meet all requirements, and may be easily interconnected with existing wiring systems.

WRITE FOR WIREMOLD ENGINEERING DATA ON FLUORESCENT LIGHTING . . .

Wiremold data sheets on Fluorescent Lighting are available to you on request. Also other important Wiremold Data Sheets showing plant wiring ideas that have proved their economy and efficiency.

THE WIREMOLD CO., HARTFORD, CONN.



ADEQUATE WIRING SERVES AND SAVES

Get to know WIREMOLD

Quick Service through Electrical Contractors everywhere

made? Shall air replacements be blown in, or allowed to infiltrate? Shall incoming air be heated?

•

Modernizing and Maintaining

Why modernize?

Is plant obsolescence or inadequacy decreasing efficiency?

Will modernization improve investment prestige?

Structural modernization and maintenance

Has complete check-up been made for all necessary or desirable repairs and alterations?

Walls—Immediate treatment of all cracks; doors caulked to keep moisture from walls; dampproofing; glass brick walls good seal for air-conditioned inclosures.

Window sash and frames—Check for warping, cracks, use of steel sash; double sash for air conditioning.

Floors—Surface hardeners for concrete; steel plates where traffic heavy; prompt action on defects in concrete to prevent deterioration; check effect of floors on fatigue.

Roofs—Leaks developing at roof flashings? Is roof well insulated? Patching frequent?

Painting—Best paints cheapest; paint manufacturers should be consulted; light paints aid illumination and keep lighting costs down.

Can appearances be improved?

Exterior—Will cleaning or painting improve? Are grounds attractive? Are fences neat?

Interior—Is main entrance attractive? Are floors good looking? Do all partitions harmonize?

Will building modernization increase efficiency?

Layout—Are aisles straight? Doorways wide?

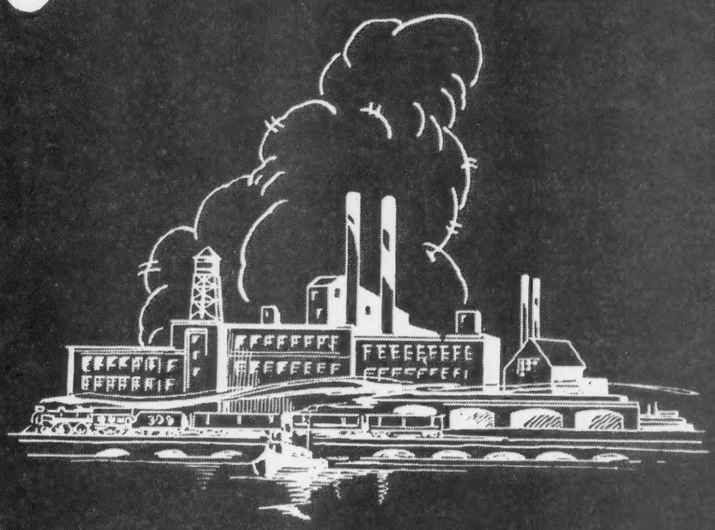
Flexibility—Will aisles, elevators, partitions, doorways, permit efficient rearrangement of machines when layout changes become necessary?

Lighting—Check intensities against tables of standard practice; prevent glare; provide proper quality.

Will modernization improve health and morale?

Check sanitary facilities for cleanliness, appearance, ventilation, efficient location. Are recreational, lunch, parking facilities provided?

Where to Locate Your Plant

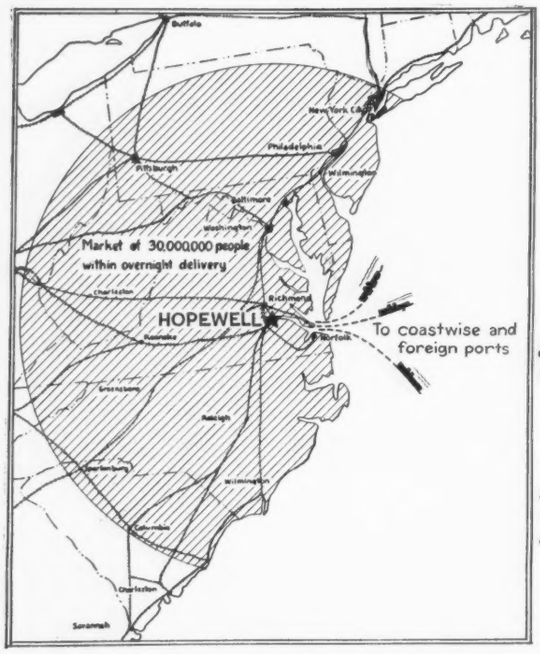


Industrial Sites **Industrial Opportunities**

Factory Properties For Sale and For Rent

Industrial Real Estate

Brokers **Agents** **Special Services**



"The Inland Port of Virginia"

Overnight Delivery to a Market of 30,000,000 People

Hopewell, Virginia

An Eastern seaboard location with unusual advantages for low-cost operation

AT Hopewell are located plants of Solvay Process Company, Tubize Chatillon Corporation, Hercules Powder Company, Hummell-Ross Fibre Corporation. Nearby are DuPont Rayon and Cellophane plants and Chemical plants.

EXCELLENT TRANSPORTATION FACILITIES

Six railways serve the Richmond-Petersburg-Hopewell triangle; coastal steamer lines; foreign shipping; 25 ft. channel from Norfolk. Excellent State Highway system in all directions.

NEARBY RAW MATERIALS

Close to coal, iron, cotton, tobacco, pulp-wood and other resources; producers of textile, tobacco and paper products; chemicals, such as nitrate of soda, ammonia, chlorine, resins, alcohol, nitric and sulphuric acids, alkalies and salts; cotton linters, rayon, fertilizers, etc., etc.

POWER

Low rates for larger power users, and unsurpassed service.

WATER SUPPLY

River water from the Appomatox limited only by pumping facilities. Suitable for process operations, including rayon.

LABOR

There exists a plentiful supply up to 10,000, male and female labor, practically all American, with agricultural background. Better quality than the usual cotton mill labor in the deep South. Excellent State Workmen's Compensation Law well administered.

INDUSTRIAL WASTE DISPOSAL

No disposal problem exists here because no cities use river water below Hopewell on the James, the river being from brackish to sea water in character, and in great volume.

STATE GOVERNMENT

Virginia is recognized everywhere as one of the best States for industrial location today and tomorrow. The list of firms that have located or expanded therein recently is most impressive. This is not only due to its natural advantages, but also to the consistently constructive attitude of the State Government towards industry.

IDEAL MANUFACTURING CLIMATE

January mean is 37.9 F. Summer climate is temperate.

The Hopewell area includes both Industrial Sites and Industrial Buildings.

For Further Particulars Address

I.S.-556 Factory Management and Maintenance

330 West 42nd St., New York City

"Where to Locate the Plant?"

"Where Shall We Build?"

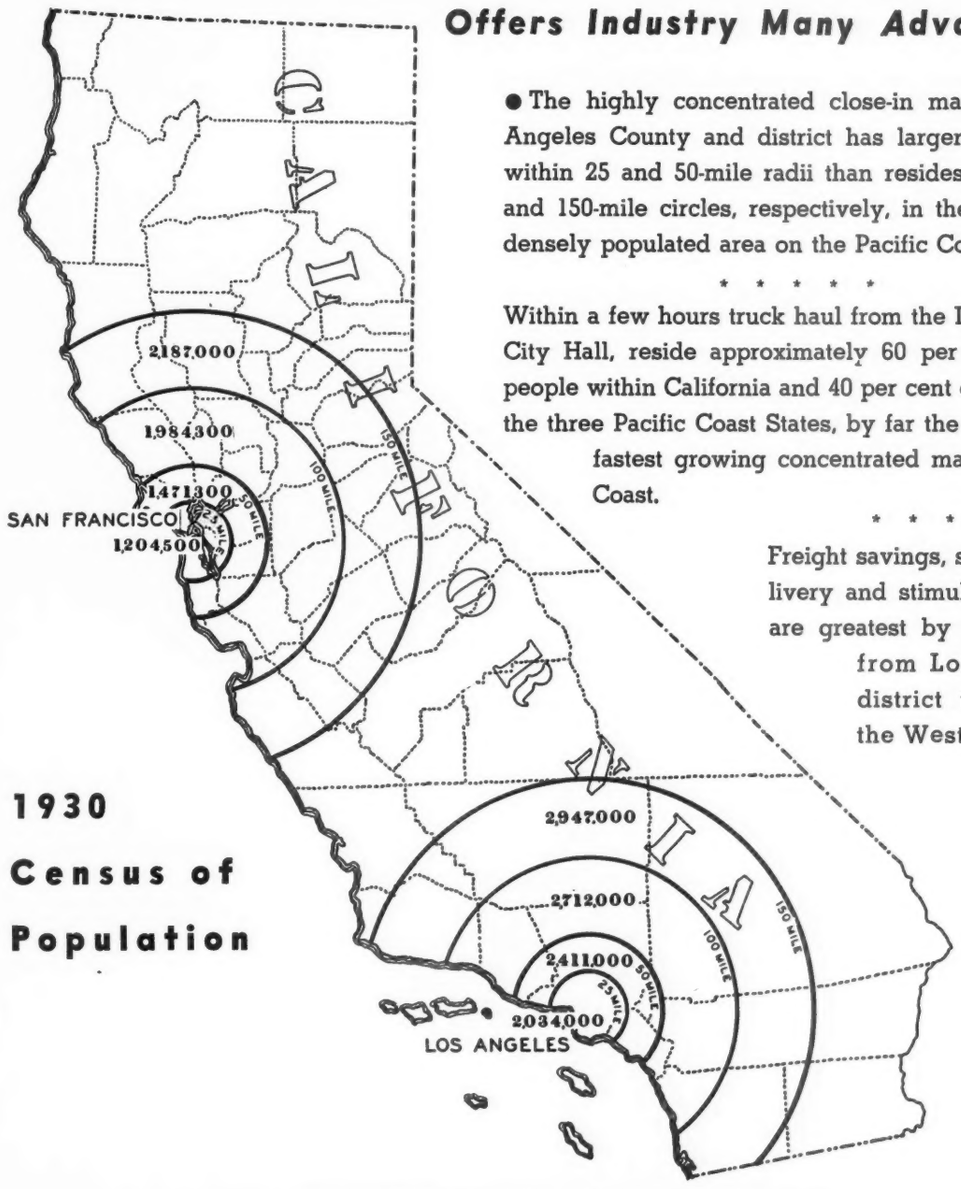
Articles titled as above, written respectively by Charles P. Wood, Industrial Engineer, of Lockwood Greene, Engineers, Inc., and George C. Smith, Assistant to the President of the Missouri - Kansas - Texas R.R. Company, and a former Chairman of the American Industrial Development Council, are major contributions on the subject of plant location from the 1937 and 1938 Industrial Plant Building sections of "Factory".

For the benefit of those executives of manufacturing plants to whom this subject is of immediate or imminent interest the foregoing articles have been assembled in reprint form and are available on request, without charge. Only a limited supply of this reprint is on hand and distribution must therefore be restricted to single copies.

Address your request to "Factory" referring to "Plant Location Reprint".

WEST'S GREATEST MARKET AND MANUFACTURING CENTER

Offers Industry Many Advantages



1930 Census of Population

● The highly concentrated close-in market of Los Angeles County and district has larger population within 25 and 50-mile radii than resides within 100 and 150-mile circles, respectively, in the next most densely populated area on the Pacific Coast.

* * * * *

Within a few hours truck haul from the Los Angeles City Hall, reside approximately 60 per cent of all people within California and 40 per cent of all within the three Pacific Coast States, by far the largest and fastest growing concentrated market on the Coast.

* * * *

Freight savings, speed of delivery and stimulus of sales are greatest by distributing from Los Angeles district throughout the Western States.

WESTERN MAJOR INDUSTRIAL AREA

● Los Angeles County produced *more than $1,200,000,000* manufactured output in 1937, a larger amount than the banner year 1929, and 44% gain over 1935. This was approximately 42 per cent of California production. It included thirty-six *diversified groups*, with an output of more than $5,000,000 each. As a County this area advanced from twenty-seventh to fifth in value of manufactured products within a period of 16 years ending 1935. Figures exclude motion picture production.

FOR FREE SURVEYS, MARKET CHECK-UPS AND TECHNICAL DATA, ADDRESS:

***Industrial Department,* LOS ANGELES CHAMBER OF COMMERCE**
LOS ANGELES, CALIFORNIA

Follow the Trend to NEW JERSEY

150,000 sq. ft. . . FOR RENT (Whole or Part) 1-story; sawtooth roof; high ceiling; live steam; sprinklered; free water; railroad siding; expansion available.

75,000 sq. ft. . . SALE OR RENT; 1-story; machine shop construction; high-pressure boilers; railroad siding; extra land.

68,000 sq. ft. . . SALE OR RENT; 1-story; monitor roof; high-pressure boilers; sprinklered; excellent condition; crane facilities; railroad siding; 20 minutes to New York City.

30,000 sq. ft. . . SALE OR RENT; 1-story; recent construction; A-1 condition; sprinklered; railroad siding car-level height; extra land.

FACTORIES • LOFTS • RAILROAD SIDINGS • WATERFRONTS

32 Years of Outstanding Industrial Real Estate Service in New Jersey

KISLAK BUILDING
32 Journal Square

J K KISLAK Inc.
"The Live Wire"

JERSEY CITY, N. J.
Journal Sq. 2-7100-9

251 NEW INDUSTRIES IN ASSOCIATED AREAS

DURING the past year, the Associated System has helped the communities it serves to gain 251 new industries, employing 7,956 workers. In addition, 228 industries which were located in these communities, expanded their operations, employing 5,826 more workers.

This activity resulted from a definite *industrial development program*, in which community organizations, Associated operating companies, and the System's Industrial Development Division cooperated. The object of this program is to assist industrial concerns to find sites where they can operate more efficiently, and to help existing industries expand their operations—both activities resulting in increased employment in the areas served.

Full information about the industrial advantages of Associated areas in the Middle Atlantic, South Atlantic, and Middle Western States will be supplied upon request of our Industrial Development Division, 150 Broadway, New York City.

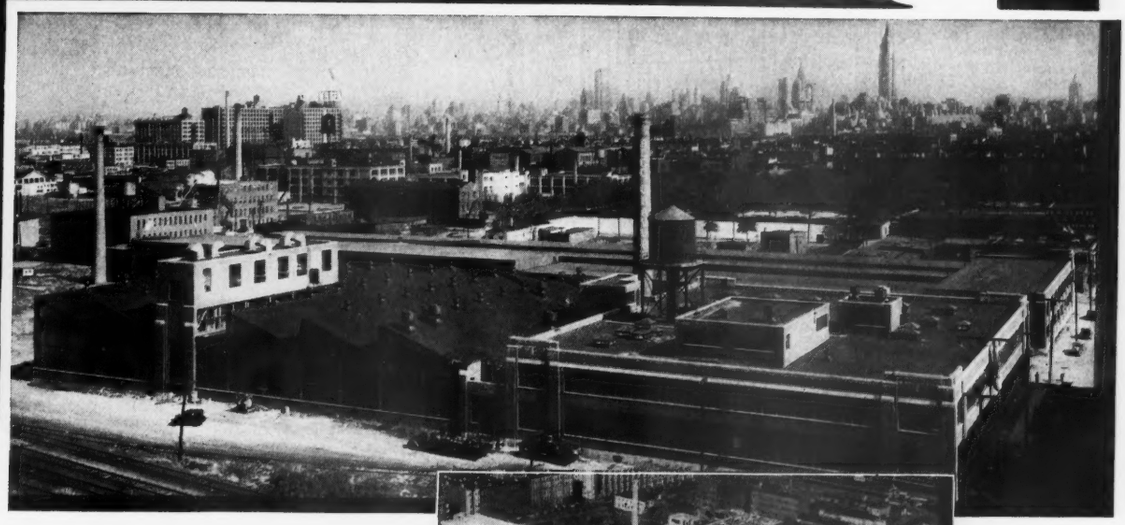
ASSOCIATED GAS & ELECTRIC SYSTEM

Why THIS SURGE OF NEW INDUSTRY* INTO HOBOKEN N. J.

INDUSTRIAL BUILDING RISES IN HOBOKEN

City Shows Huge Jump for 1938

Although building construction in 71 principle Middle Atlantic cities dropped 13.37% during the past year, Hoboken experienced an increase of 236.62%. Practically this entire figure represents industrial construction.



(Above) Headquarters plant of Alco-Gravure Division of Publication Corporation. Built in 1938. Just beyond, loom the skyscrapers of New York.

TO the industrialist—or to the location expert—Hoboken's advantages need no introduction. But—the tremendous influx of *new* industry has focused new nation-wide interest on Hoboken's opportunities for industry and commerce everywhere!

A Hoboken location for your plant or warehouse means economies without equal in the heart of the New York Metropolitan Area. Speedy trucking facilities to New York via Holland Tunnel and Lincoln Tunnel. Eight ferry lines between New York and this section. Major highways to points north, west, south. Eight railroads with direct lines or switching facilities. Water transportation to all the world from Hoboken piers.

A broad policy of cooperation with industry locating here, has embarked Hoboken on its greatest era of industrial expansion! Write for complete facts about the thriving New Industrial Hoboken.

(Above) The mammoth $2,000,000 General Foods Corporation plant now under construction.

Plant of Sweets Corporation of America, Inc. Manufacturers of "Tootsie Rolls".

HOBOKEN INDUSTRIAL COMMITTEE

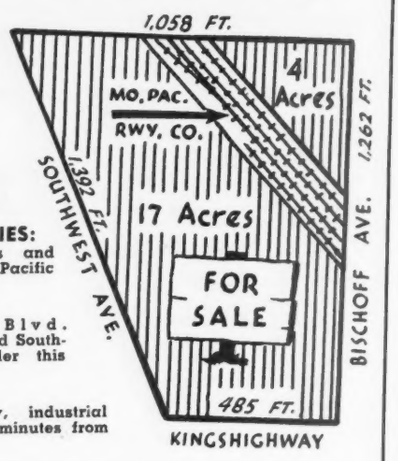
1 Newark St. Room 18 Hoboken, N. J.

LOW TRUCKING COSTS • • • "RAIL-TO-KEEL" FACILITIES

FOR ECONOMY IN PRODUCTION and DISTRIBUTION *Locate in Hoboken*

LARGEST UNIMPROVED INDUSTRIAL TRACT
on Boulevard **IN ST. LOUIS**

21 ACRES
In Whole or Part.



4 Great Advantages

1 **RAIL FACILITIES:** 2 Main Tracks and spurs, Missouri Pacific Railway

2 **HIGHWAYS:** Kingshighway Blvd. (Main Artery) and Southwest Ave. border this property.

3 **LOCATION:** Corner property, industrial section, only 15 minutes from center of city.

4 **21 ACRES—** Property on both sides of railroad. Will sell in whole or part.

Inquire:

E. L. Wehmeyer
BREITT & NAUMER
702 Pine Street
St. Louis, Mo.

OR

Eliot Dunn
CROSS & BROWN
270 Madison Avenue
New York City

SEGAL SERVICES
to Industry and Commerce

•

to those planning on
New Construction or Expansion

FACTORY SITES—
Advantageous locations anywhere in USA
At attractive prices

PLANTS—
Modern buildings 20 M sq. ft. to 500,000 sq. ft.
At a fraction of reconstruction Costs

MACHINERY—
We will help equip your entire plant with new or slightly used modern machinery at worthwhile savings.

HASCO *Incorporated* SEGAL SERVICES

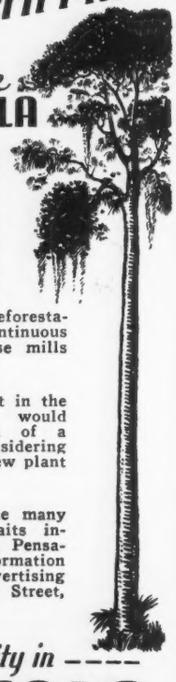
We will sell your excess plants or equipment on a proven satisfactory basis

Advise your Problems

HERBERT *action* SEGAL
Manager

Main Office: 2 ORANGE STREET, NEWARK, N. J.

There's Gold in Southern Pine
—and there's pine near PENSACOLA



One of the outstanding developments in the South during recent years has been the discovery of methods of making paper from southern pine. Three great mills have been established within 150 miles of Pensacola in areas where, through reforestation, there will be a continuous supply of pine for these mills for an indefinite period.

Vast areas of pine forest in the vicinity of Pensacola would merit the investigation of a paper manufacturer considering the establishment of a new plant in the South.

This is just one of the many opportunities which awaits industry and commerce at Pensacola. For further information address Municipal Advertising Board, 22 West Garden Street, Pensacola, Florida.

There's Opportunity in ----
PENSACOLA
FLORIDA × *On the Gulf*

Are You interested in the Industrial Development of Your Community?

The executives of industrial establishments usually are, for one reason or another. On many occasions they are the ones to initiate thought in this direction. In practically every instance they are called upon to subscribe to such efforts both morally and financially. To industrial executives invited to participate in the industrial development of their community, who are not familiar with the procedure and would welcome some information on the subject, "Factory" is pleased to offer—with its compliments—these three booklets:

1—Fundamentals of Community Industrial Development
2—A Master Survey for Community Industrial Development
3—How to Conduct a Campaign for Community Industrial Development

While the booklets were written and first circulated more than a decade ago the facts they review and emphasize are even more applicable today than at that time.

"Factory" offers these pamphlets to interested industrial executives in the belief that they will prove of value in conserving their time and aiding their accomplishment. Address your request to "Factory" and refer to the "Community Industrial Development" booklets.

A special service to "Factory" readers:

The post-paid card on page 142 is for the convenience of readers of "Factory" in obtaining advertisers literature supplementing the information given in their advertisements in this issue.

Use the post-paid card on page 142

LOWER COSTS MEAN HIGHER PROFITS IN MIDDLESEX COUNTY, N. J.

It Costs Less to Produce Goods in Middlesex County

Start at the beginning: rent and land are cheap. Whether you buy or lease, desirable properties—many with private railroad sidings and river frontage—are available at attractive prices. Heat, fuel and power are also low, with night utility rate only 6 mills/KWH.

Labor, too, costs less. Labor does not work at sweat shop wages in Middlesex County. But labor *does* work loyally, wholeheartedly, contentedly. Partly responsible for labor's cooperation are unexcelled recreational, health and educational facilities. Proof of the pudding: labor's record shows no strife, no dissension.

It Costs Less to Sell Goods in Middlesex County

Your primary markets are nearby—New York only 30 miles away, Philadelphia just 60. Within over-night trucking distance live the 22,000,000 people who earn 26% of the nation's income. New Jersey, incidentally, levies no state tax on personal income.

It Costs Less to Ship Goods in Middlesex County

Four trunk line railroads, *plus* America's finest highway system, *plus* deep-water channels at Perth Amboy and Carteret give ready access by land or sea to the four corners of the world. Industry's shining names—American Cyanamid, Bakelite, Barber Asphalt, Carborundum, Celotex, Cheseborough, du Pont, Flako, General Cigar, Hercules Powder, Johnson & Johnson, Mack Trucks, Squibb, Zonite and others—know all this *from experience.*

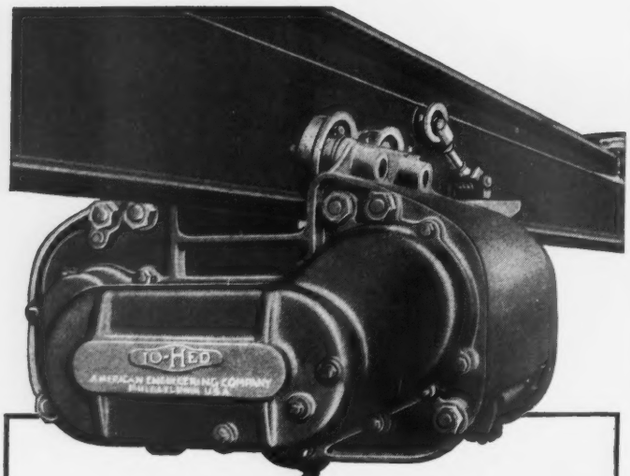
SPECIAL

Two municipal owned parcels now obtainable at unusually low figures. One 186 acres, other 46 acres. Both have private railroad sidings, both have 30 foot channels. For further information about these and other properties, address Peter M. Kroeger, Industrial Commissioner, Board of Freeholders, New Brunswick, N. J.

Municipalities in Middlesex County:
Carteret, Dunellen, Metuchen, Milltown, New Brunswick, Perth Amboy, Sayreville, South Amboy, South River, Woodbridge and fifteen others.

MIDDLESEX COUNTY, N. J.

solves both production and distribution problems . . . a short-cut to the primary markets, New York and Philadelphia.



For Short Hauls

use the

PLAIN TROLLEY TYPE

A-E-CO LO-HED HOIST

The *plain trolley type* A-E-CO Lo-Hed hoist—the one you can pull along the rail—is the sensible choice under these conditions:

1. When the haul is short and the load not too heavy.
2. When the path under the hoist is walkable.
3. When the haul is long but seldom repeated.
4. When time is no great factor. For details of this and all other Lo-Hed hoists, send for our new catalog today.

A-E-CO POINTS

- Available in capacities of 1/4 to 6 tons.
- Operates on Standard I-beams or track of any make.
- Low headroom—stacks materials higher than any other hoist.
- Safe, fool-proof.
- Compact, strong, simply constructed.
- Exceptionally low maintenance.
- Protected against dust, moisture, fumes.
- Heavy duty, ball-bearing HOIST motor.
- Automatic lowering brake.
- Ball or roller bearings at vital points.
- Improved plow-steel cable.
- 100% positive automatic stop.
- Efficient spur-gear drive . . . and

LO-HED COSTS LESS PER LIFT

AMERICAN ENGINEERING COMPANY

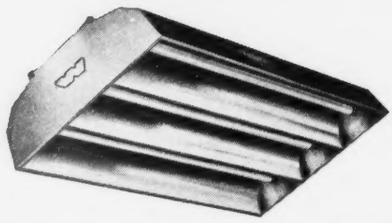
A-E-CO Lo-Hed HOISTS

2426 ARAMINGO AVE., PHILADELPHIA, PA.

OTHER A-E-CO PRODUCTS: TAYLOR STOKER UNITS
MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

Wheeler FLUORESCENT DAYLIGHT ILLUMINATION

for Assembly, Inspection and Color-Matching Tasks



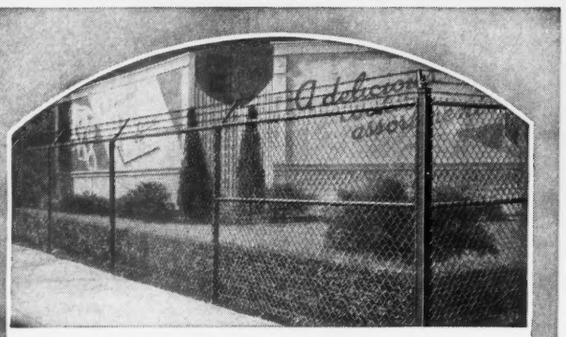
The Individual Reflector Type Fluorescent Fixture, shown above, is designed for use with the Fluorescent Daylight Lamp. This unit furnishes an abundance of the cool, efficient artificial daylight so desirable for locations where assembling, sorting, grading, finishing, color-matching or identification work is done.

Fixtures are made up with individual specular ALZAK reflectors which control and direct the greatest amount of useful light to the working plane.

This particular unit is made for use with the 15, 20 and 30 watt lamps in one, two and three lamp constructions. Many other types of Fluorescent Fixtures are described in the new bulletin "Wheeler Lighting Fixtures for Fluorescent Lamps". Write for your copy!

Distributed Exclusively Through Electrical Wholesalers

WHEELER REFLECTOR COMPANY
275 Congress St., Boston, Mass.



ANCHOR FENCES Stay in Line

Anchor Fences give *permanent* protection against trespassers, trouble-makers; help organize plant traffic. They always stand straight and true because their deep-driven "anchors" spread out under ground and keep the posts permanently in line.

For nearly half a century, industrial organizations have relied on Anchor Fences and the skill of Anchor's Nation Wide Erecting Service for the solution of countless industrial fencing problems. Write today for Anchor Manual and address of nearest Branch Office.

(Above) Anchor Chain Link Fence protecting industrial property. Anchor's complete line of fences and gates also includes Iron Picket Fences for all industrial purposes.

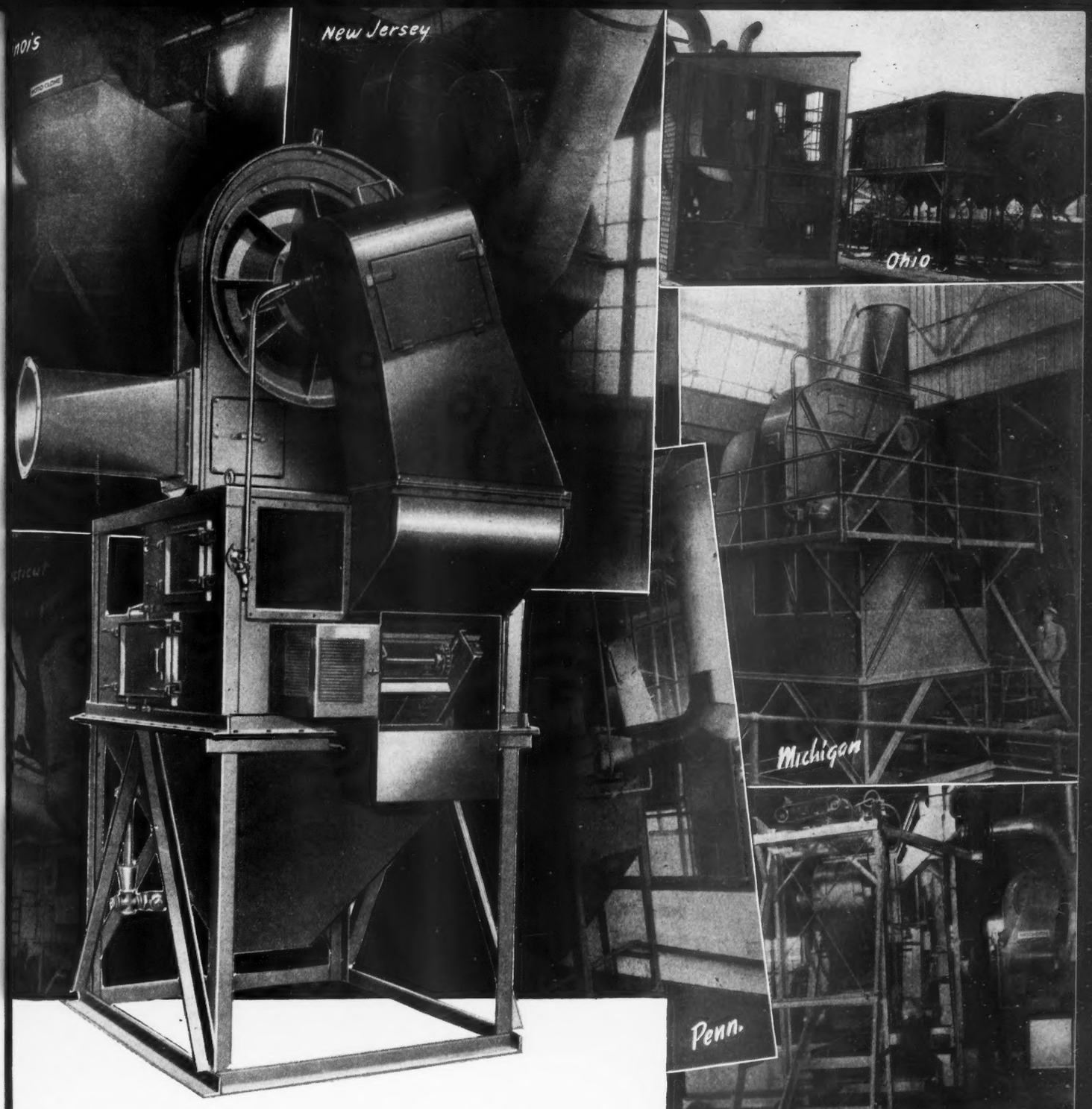
FREE ANCHOR FENCE MANUAL

Write today for Anchor Industrial Fence Manual containing ideas, specifications, that will help you solve your fence problems.

Anchor Post Fence Co.
6620 Eastern Ave.
Baltimore, Md.

ANCHOR FENCES

CHAIN LINK
IRON PICKET
for Every Purpose



WHEREVER THERE ARE PROCESS DUST PROBLEMS

Industrial plants—large and small—have found the Type W Roto-Clone the most satisfactory and economical solution of their process dust problems.

Hundreds of installations in all types of factories are proving their high efficiency and outstanding performance under all operating conditions.

Complete information on the application of Roto-Clone to industrial dust problems is available. Write for complete engineering data.

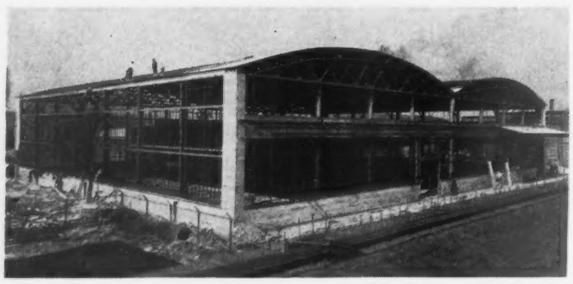
AMERICAN AIR FILTER CO., INC.
Incorporated
302 Central Ave., Louisville, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

ROTO-CLONE
WATER SPRAY
DYNAMIC PRECIPITATOR

IR FILTRATION AAF DUST CONTROL

DO YOU NEED A NEW BUILDING?

INTERNATIONAL can supply it QUICKLY and at LOW COST



WAREHOUSE—For the Sunbeam Electric Mfg. Co., one of the largest manufacturers of electric refrigerators. Steel windows afford maximum daylight. Economically designed, with 80' clear-span bowstring steel trusses.

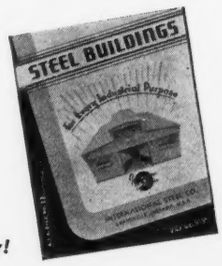
STEEL-MASONRY INDUSTRIAL PLANT—The structural steel, steel sash and fire-proof steel roof sheets for this 100'x260' factory of the Reynolds Metal Co. were furnished by International.

Whether you want a garage, machine shop, factory building or warehouse—you can get an International Standardized Steel Building that meets your exact needs—in a few weeks—and at less cost.

International *saves you time* by carrying a full range of standard steel sections in stock. And International *saves you money* by utilizing every "short cut" and by standardizing materials.

For low original cost, low maintenance cost, low insurance rates, ease of alteration and long life, investigate International Standardized Steel Buildings!

International structural steel, fabricated steel windows and steel deck roofs are used extensively on numerous steel-masonry and steel buildings. International engineers have made a careful study of industrial buildings; their help will be valuable in designing new buildings.



Write for International's New Catalog Today!

INTERNATIONAL STEEL COMPANY

601 W. Tennessee St. Evansville, Ind.

LET WEST GUARANTEED PRODUCT HELP YOU SOLVE YOUR FLOOR PROBLEMS

THE WEST DISINFECTING COMPANY offers a complete line of products particularly suited to preserve and maintain all types of floors. West products will help preserve floors subject to heavy traffic. Competent and thoroughly trained men will make a complete survey of your floors without obligation.

FILPOR or pigmented Filpor which comes in 8 colors, is an ideal product for finishing and preserving floor surfaces that receive the brunt of heavy traffic. It enters the pores of the floor surface, forming a protective, hard surface that helps keep out oil, water and other foreign matter.

LASTINCOTE is an especially hard finish prepared to maintain actively used floors and will help lower maintenance expense. Lastincote is impervious to alcohol, alkali soaps, acids, boiling water, ink, oil, grease and salt or fresh water. It produces a beautiful, glossy, yet non-skid finish.

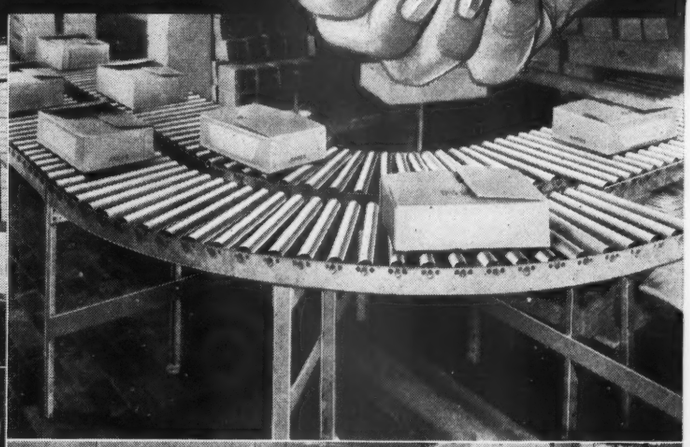
TRAKPRUF—An excellent finish for the treatment of concrete floors in industrial plants where acids and similar chemicals disintegrate the concrete floors and cause dusting of the cement. It has also proven highly satisfactory for wood floors in food plants.

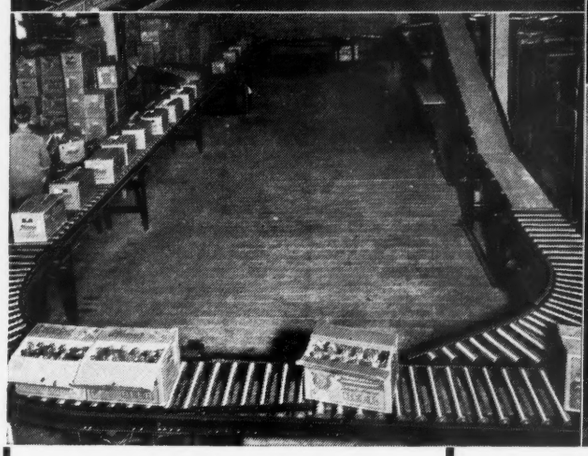
WEST DISINFECTING COMPANY

DEPT. J, 42-16 BARN STREET, LONG ISLAND CITY, NEW YORK

Send for our Special Booklets for more Detailed Information

FASTER TIME THROUGH THE PRODUCTION LINE





A NATION-WIDE SERVICE IN CONVEYOR ENGINEERING

You will find Standard Conveyor Engineers in each of the following cities:

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PLAN YOUR MATERIAL HANDLING TO SPEED PRODUCTION AND LOWER COSTS

Planned handling through conveyor engineering and installation makes for faster time through the production line . . . speedier, less costly handling of goods in warehouse and shipping department.

Standard Engineers . . . specialists in conveyor engineering, with an experience record of over thirty years . . . will assist you in improving your present material handling methods and equipment. There is a Standard office near you—communicate with them.

"Conveyors by Standard" FM-4—a valuable reference book on conveyors and conveying methods. Sent free to plant and production executives.

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Ideal FOOD CONVEYORS

● Employees work better . . . produce more . . . when Ideal Food Conveyors provide periodic food distribution throughout the factory.

Where mass production organization and machinery demand continuous concentration on the job, Ideal food service helps maintain workers' mental and physical well-being, increases efficiency, reduces accidents, conserves time. Both employers and employees benefit from increased production.

A wide selection of models provides every type of service . . . from simple hamburgers, sandwiches, pastry, coffee, milk, candies, tobacco, etc., to a full cafeteria menu including also hot sandwiches, soups, stews and chilled desserts.

Ideal Conveyor Model No. C-843 shown above provides maximum size with minimum weight. It is 97" long, 44" wide, 60" high. Aluminum body and framework; copper refrigeration tank. Heated compartment has stainless steel at all points that contact food.

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A FLOOR UNDER PROFITS A CEILING OVER COSTS—

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● NO NOISE!

4 Models

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This doorless booth blots up plant racket

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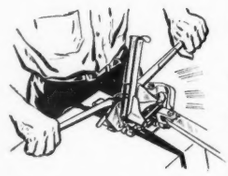
"WE REDUCED COSTS *After Production* By 63c per unit

. . . with Acme Steelstrap, Seals and Tools"



Beyond the production line . . . manufacturers are cutting costs and stopping profit leaks with Acme Steelstrap, seals and equipment.

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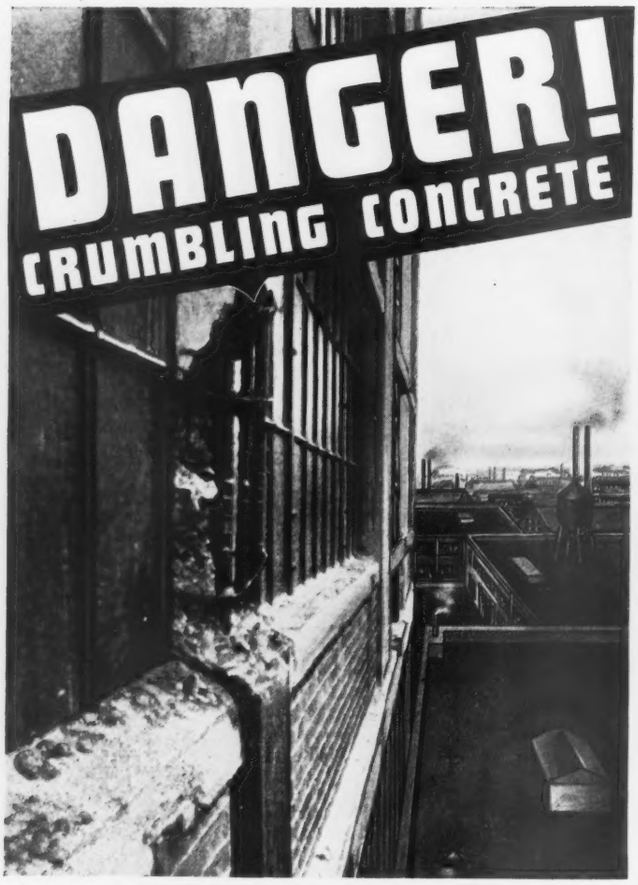


Today's Tiny Cracks Are Tomorrow's Costly Hazard

STOP THEM...

...with DUM DUM MASONOC

Small, innocent-looking cracks are the first sign of concrete deterioration. Moisture seeps in; the cracks widen and, without warning, concrete starts to crumble. When exposed, vital reinforcements are attacked by rust, window frames buckle and walls start to settle with disastrous results. You can avoid this costly hazard with DUM DUM MASONOC, a tough, rubbery, decorative weather-proofing material—15 to 20 times the thickness of paint—that seals cracks against the destructive forces of weather.

PREVENTS NEW CRACKS

Because it stays semi-plastic, DUM DUM MASONOC expands and contracts with movements of the building surface, thus preventing formation of new cracks. Send for complete information about this *different* protective coating for concrete which has saved thousands of dollars for its users.

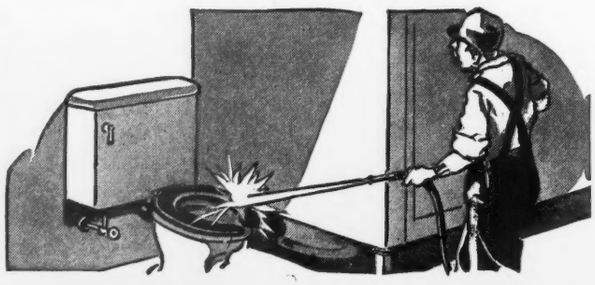
DUM DUM MASONOC

A PRODUCT OF

The Arco Company

CLEVELAND • LOS ANGELES

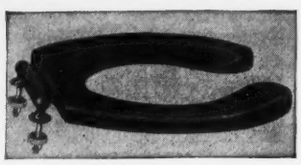
Easiest To Clean!



CHURCH *Sani* SEATS

CHURCH MOL-TEX—A new white plastic developed by CHURCH to meet the demand for an indestructible *white* toilet seat—waterproof, acid proof. Medicine stains or cigarette burns are quickly removed. Its first cost is the last cost and *its first cost is surprisingly low.*

CHURCH SANI-BLACK—An integral, indestructible unit — lasts the life of the building. Lustrous and attractive — no screws or parts to work loose — impervious to moisture, acids, heat, cold, or corrosion — withstands the roughest treatment. Easily cleaned—incomparably sanitary.



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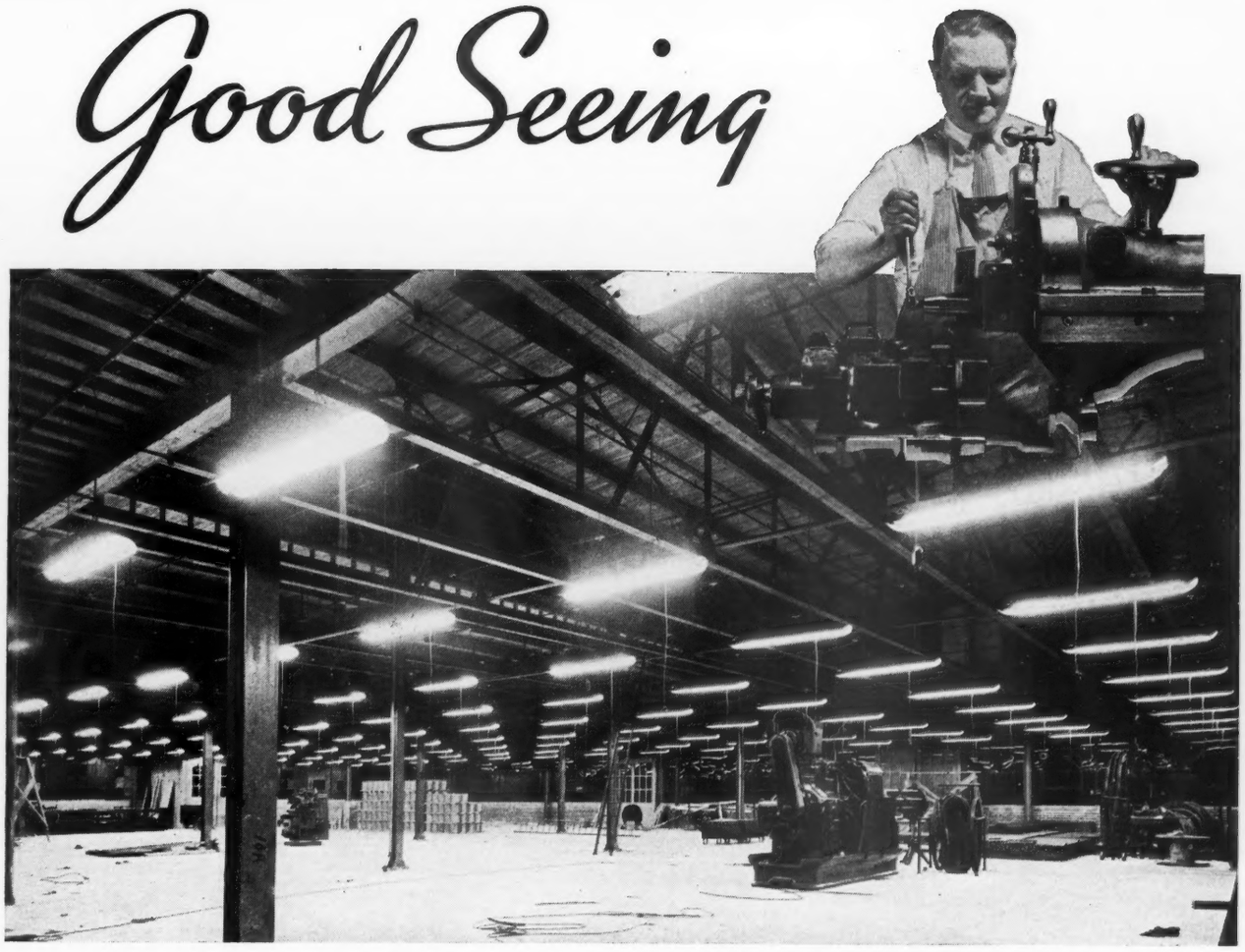
CONTINENTAL *Chain-Link* FENCE

Good Seeing



. . . is the vital link between good workmen and good work

Human eyes are industry's most critical control devices . . . for this reason, if for no other, their well-being is a matter of vital concern. Indeed, Americans can look forward with envy to the day when their homes, their schools, and their public buildings are all as well-lighted as the modern industrial working-place.

This fact will bring scant comfort to those who search for evidence that the so-called "selfish interest" of industry and the personal welfare of industrial workers are bound to be in conflict. For, clearly, the value of a sight-saving standard of seeing extends beyond mere "productive efficiency" to protect human welfare both while on the job and also after the day's work is done.

Good lighting conquers visual strain, it makes work safer, makes surroundings cheerier, and ends the nervous tension that comes from eye-fatigue. At the end of a shift in the well-lighted plant, employees leave their work clear-eyed, visually fit for hours of recreation and home life.

In this trend to a better standard of seeing in industry, the General Electric Vapor Lamp Company has played a highly significant part. For General Electric mercury lighting, engineered by lighting specialists to the seeing tasks involved, has made it possible to provide sight-saving lighting at a cost well justified in industrial gains alone. Thus, motives of "good business" and human well-being are merged at a single goal—a clear-cut example of the fact that the profit-system points the way to a brighter future for America. General Electric Vapor Lamp Company, 805 Adams Street, Hoboken, New Jersey.

GENERAL ELECTRIC VAPOR LAMP COMPANY

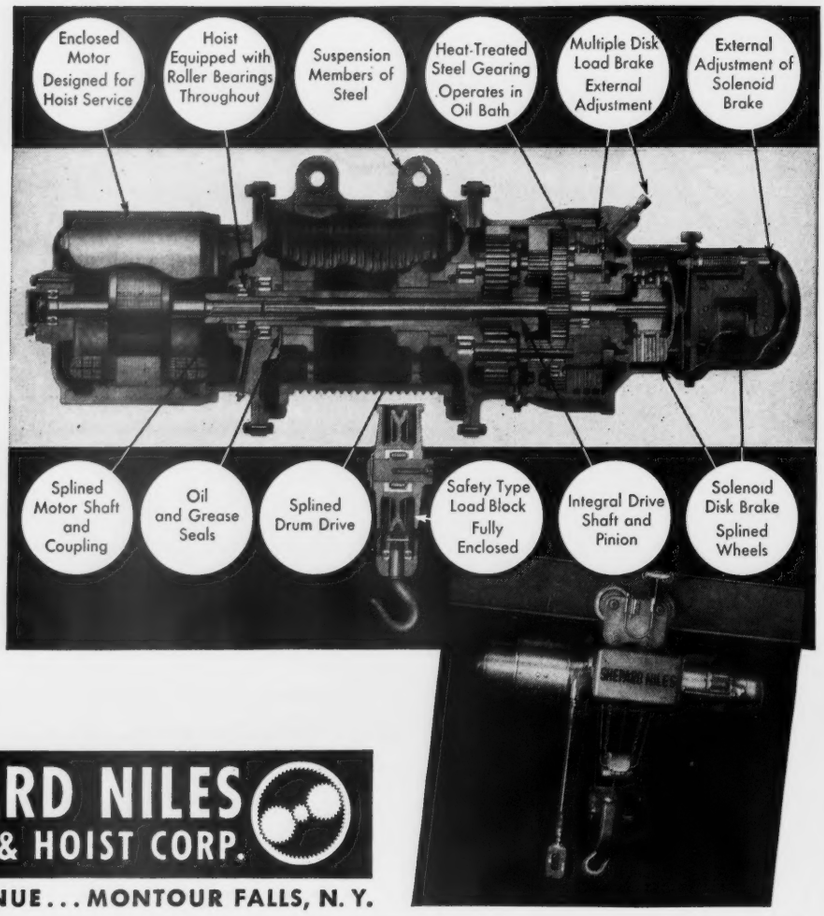
938C

The new LIFT ABOUT ELECTRIC HOIST

CAPACITIES ONE-EIGHTH TO TWENTY TONS

● After thousands of lifts and years of service the perfectly balanced hoisting mechanism of the LiftAbout functions smoothly in its bath of oil. Complete enclosures seal all vital parts against dust, dirt and moisture.

It is available in a wide range of types and sizes. For typical applications and more complete information write for Bulletin No. 126.


Enclosed Motor Designed for Hoist Service
Hoist Equipped with Roller Bearings Throughout
Suspension Members of Steel
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Multiple Disk Load Brake External Adjustment
External Adjustment of Solenoid Brake
Splined Motor Shaft and Coupling
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Safety Type Load Block Fully Enclosed
Integral Drive Shaft and Pinion
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SHEPARD NILES CRANE & HOIST CORP.

364 SCHUYLER AVENUE... MONTOUR FALLS, N. Y.

REPAIR CONCRETE to a TOUGH *FEATHER* EDGE . . .

RUGGEDWEAR RESURFACER, made with Cellulose, may be used for patching concrete or over an entire area . . . indoors or out. Stands up under the heaviest floor traffic. No chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to the irregular concrete edge . . . leaves no joint or crevice to become chipped and filled with dirt. Provides a firmer, tougher, smoother, more rugged wearing surface. Dries fast. Costs only 10c to 14c per sq. ft.

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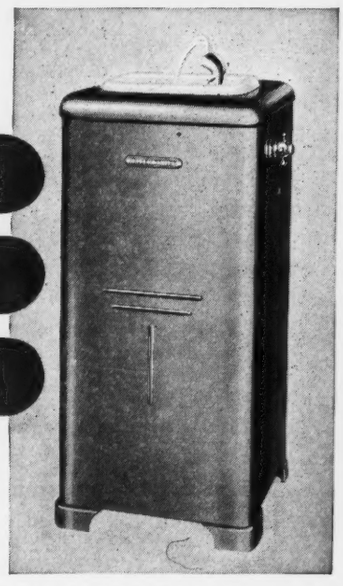

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Manufacturers of Halsey Taylor Drinking Fountains

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Air Conditioning, Heating, Ventilating

1 **AIR CONDITIONING** — Bulletin 107 gives complete description, capacity ratings, etc. of units for use in offices, factory departments, laboratories, etc. Designed for cooling only or complete conditioning. Few, if any, building alterations required to install. Can be suspended from ceiling or floor mounted—very compact and easy to install. Clarage Fan Co.

2 **INDUSTRIAL AIR CONDITIONING, REFRIGERATION, SPACE HEATING**—Catalog describes all these services. Each is taken up in a separate section devoted to illustrating various models and giving operation and installation data. Also includes data as to performance and physical characteristics. A complete index designed to show the interrelation of these services makes for easy reference. Carrier Corp.

3 **AIR CONDITIONING**—New 1939 bulletin outlines most modern principles of design, methods and equipment items for industrial systems. Installations for different types of manufacturing plants are described with illustrations. Subjects include reference to initial and operating costs. An up-to-date 20-page treatise. J. O. Ross Engineering Corp.

4 **FANS AND BLOWERS**—Bulletin No. 2966C describes line of fans and blowers with illustrating photographs. Operating data and dimensions in table form, plus line drawing diagrams aid the reader. In addition, each type illustrated has a few descriptive paragraphs explaining construction features. Also, 4-page folder on suspended evaporative condensers. Buffalo Forge Company.

5 **FANS FOR INDUSTRY**—A complete colorful catalog, No. X3349, illustrating and describing desk, stand, ceiling, air circulator, exhaust and ventilating fans and accessories. Features new fans with improved performance and design distinguished by their famous 5-year factory-to-user guarantee. Detail construction features, performance and prices are included. The Emerson Electric Mfg. Co.

6 **ELECTRIC VENTILATING FANS, BLOWERS, AND UNIT HEATERS**—Condensed pocket size catalog measuring 3⅜"x5¾". Contains 48 pages devoted to pictures, descriptions, capacities, and dimensions of above products. Ilg Electric Ventilating Co.

7 **THIS SOUND FILM WILL BRING YOU UP-TO-DATE ON PLANT HEATING**—In "Making It Hot for Sandy" you can see, hear and in 15 minutes completely visualize: How a Unit Heater Operates; Its Construction; The "Heat As You Light" Principle; Why Unit Heaters Save Fuel; Advantages of Unit Heating Over Older Systems. Presented at your office, home or local association group meeting on request. No cost or obligation. Modine Mfg. Co.

8 **FLOODLIGHTS OF HEAT**—Bulletin describes various principles of heating large areas compared with most modern Wing Featherweight Floodlight principle. Profusely illustrated with photos and charts, tables and graphs. Explains how hot and cold spots can be eliminated and healthful, uniform heat obtained throughout working area. L. J. Wing Mfg. Co.

9 **ELECTRIC UNIT HEATERS**—Bulletin No. 38-A describes economy and utility of industrial heating by electricity. Bulletin describes exclusive and patented cast aluminum grid construction of "Electromode" heaters. Shows many applications where electric heating can effect unusual economies. Electric Air Heater Co., Div. of Amer. Foundry Equip. Co.

10 **UNIT HEATERS**—For floor installation or ceiling suspension. 16-page bulletin gives data and capacities on all sizes designed with centrifugal fans for large area heating. Can be furnished with Synchrotherm Control. Describes how this control provides uniform temperatures with definite savings in fuel costs. Clarage Fan Co.

11 **UNIT HEATERS**—Attractive catalog explaining the advantages of unit heating for comfort and economy, for new buildings or for modernizing the heating of present industrial buildings. Capacity ratings are listed for 28 sizes; also construction details, dimensions and typical diagrams. Grinnell Company, Inc.

12 **FEATHERFIN HEATERS**—Bulletin describes the latest copper fin tube heating surface with unique feature of varying amount of surface to give just the desired temperature rise. The Safe-Against-Freezing Type permits control of temperature without throttling steam. L. J. Wing Mfg. Co.

13 **UNIT COOLERS**—8-page pamphlet describes and illustrates various types of unit coolers, suspended, floor and flat suspended. Rating tables are supplied for each type, including steel coil and copper coil units. Dimensions are given in table form with explanatory diagrams. Also, folder on air washer type central conditioning equipment. Buffalo Forge Company.

14 **INDUSTRIAL VENTILATION**—Complete catalogs on industrial ventilation equipment. Multi-Vane Ventilators in a wide range of sizes, wind operated. Electro-Wind Ventilators, air or power operated. Type "C" Ventilators for chimney jobs. Exhaust fans. Attic fans. Catalogs show sizes and specifications. Allen Corp.

15 **VENTILATORS AND SKYLIGHTS**—16-page booklet showing all types of motorless, revolving ventilators and numerous designs of skylights for industrial application. Complete description, sizes, weights and capacities are given for ventilators, together with necessary installation information. Milcor Steel Co.

16 **ROOF VENTILATORS**—Complete data sheets and catalogs available on Roof Ventilators of all types, including Stationary, Revolving, Continuous Ridge and Electric Fan Units. Also, similar material for Gravity Oil Filters and Steam Exhaust Heads. Burt Mfg. Co.

17 **INDUSTRIAL SKYLIGHTS**—Catalog illustrates various installations and shows the advantages of ventilating skylights to supply maximum light and adequate ventilation. Construction features and operating mechanism are described. Complete specifications and data are included, plus pictures of various models. Can be supplied in galvanized iron, stainless steel, aluminum or copper. Vent-O-Lite Co.

Air Filters, Fume Control

18 **ELECTROSTATIC AIR FILTER**—Electro-Matic Bulletin No. 250 describes a new development in which electrical precipitation has been combined as an integral part of an automatic viscuous air filter to obtain maximum efficiency in the removal of atmospheric dust and smoke over a wide range of particle sizes. American Air Filter Co., Inc.

19 **ELECTROSTATIC PRECIPITRONS**—Bulletin describing the advantages of the Electrostatic Precipitron for industrial air cleaning. A complete description of apparatus available, operating characterstics, efficiency ratings and description of typical installations in industry. Pangborn Corp.

Buildings

20 **STEEL BUILDING MATERIALS**—Catalogs available. B-37 covers complete line of standardized steel buildings showing low cost per square foot; T-37 on complete line of standardized steel roof trusses for all types of industrial warehouse buildings; Steel Deck circular covering steel dcek roof sheets for fire resistance, low maintenance and prices comparable with wood. International Steel Co.

21 **STEEL BUILDINGS, ROOF TRUSSES**—Catalogs and folders on standardized steel buildings plus new catalog, now on press, showing typical constructions of small and large buildings. Also, catalog and folder on bowstring standardized roof trusses showing different types of buildings under construction and completed. Gives details of construction. Geo. L. Mesker & Co.

Communication Equipment

22 **ELECTRIC TELETALK**—Complete data on this electric intercommunication system as to models, circuits, applications, specimen systems, installation and service data, list of users and costs for simple two-station systems or for systems employing an unlimited number of stations, either centralized or decentralized. Webster Electric Co.

Save Time and Money By

23 **ACOUSTIC TELEPHONE BOOTHS**—Bulletin 128 describes scientifically designed telephone booths, adapted to use in either factory or office. Interior treated with acoustic lining which blots up outside noise. Always well ventilated and sanitary. Approved by telephone engineers. Four models available. Burgess Battery Company.

Compressors

24 **COMPRESSORS** — Bulletin HAC-40 describes single-stage, horizontal air compressors designed for use where heavy-duty full-load continuous service is essential. Complete facts and many illustrations of uses and construction details. A table of ratings is included. Gardner-Denver Co.

Construction and Maintenance Materials

25 **INDUSTRIAL PRODUCTS**—Catalog contains information and recommendations on high and low insulations for every industrial need; specifications on J-M Built-up Roofs; information on J-M Corrugated Transite for roofing and siding; J-M industrial friction materials; Transite Electrical Conduit and Korduct, Asbestos Ebony and other J-M electrical materials; Transite Pipe; and J-M packings and gaskets. Johns-Manville.

26 **WOOD PRESERVING BY PRESSURE TREATING** — New, illustrated booklet describes necessity for treating timber and kinds of preservatives employed. Discusses pressure processes, preparation before treatment, and economy and uses in industrial plants, coal mines, for wharves, bridges and railroad construction. Numerous photographs illustrate a wide variety of construction projects employing treated timbers. Koppers Co.

27 **MORTAR CEMENT**—Booklet discusses properties required in masonry mortar to make a weather-resistant wall when combined with various types of building units. A number of reference tables for masonry construction are included. Also instructions for mixing. Various tests show how this cement meets requirements. Lehigh Portland Cement Company.

28 **EXPANDED METAL SAMPLE KIT**—Made in filing size and contains six samples of standard and flattened expanded metals, enabling examination of material in different sizes and gauges so that practical application may be appreciated. Suggested uses, factory partitions, skylight, door and window guards, grilles, trays, etc. Milcor Steel Co.

29 **CONVENIENT MAINTENANCE CHECK CHART**—For plant operating executives and men responsible for Plant Maintenance. It simplifies the problem of selecting the right material for every type of plant maintenance and construction problem. Also included with the check chart are a group of informative bulletins describing performance-proved materials for every kind of plant and property maintenance. A. C. Horn Company.

30 **DATA FOR STEEL USERS** — Stock List has complete listing of the wide range of Certified Steel products carried in stock for immediate shipment and contains valuable data for steel users. Special bulletins describing stainless steels, alloys and tool steels, mechanical tubing, floor plate and other products are also available. Jos. T. Ryerson & Son, Inc.

31 **MATERIALS FOR MODERNIZATION**—Catalogs covering Heat Insulation for Industry, Careystone Corrugated Asbestos Cement Roofing and Siding, Master Specifications for Built-Up Roofs, and Industrial Flooring. Describe how these products are well adapted to present day remodeling of industrial structures. Philip Carey Co.

32 **EXPANDED METAL**—Full details describe Steelcrete Expanded Metal and show its wide variety of uses, partitions, window guards, shelving, racks, bins, walkways and conveyor guards. Literature discusses ease of fabrication, cost, fire safety, great strength and light weight of this product. Consolidated Expanded Metal Cos.

33 **EARLY STRENGTH CEMENT**—31-page bulletin describes what Lehigh Early Strength Cement is, what it does, and what it can be used for. Numerous photographs show typical installations and savings effected. Four pages of estimating data with explanatory notes help the reader determine comparative advantages of this and normal portland cement. Lehigh Portland Cement Co.

34 **HIGH TENSILE STEEL**—48-page book, "A. W." presents Dyn-el, gives full details of savings in weight and cost with new high-strength, flat-rolled steel. Fabricating and design properties. Sizes and weights. Alan Wood Steel Co.

35 **CONCRETE AND STUCCO RESTORATION** — Well illustrated booklet completely explains a revolutionary, decorative weather-proofing coating that bridges and fills cracks in concrete, masonry and stucco surfaces. Arco Co.

36 **STEEL DOORS**—36-page catalog fully illustrates a complete line of steel rolling, sectional upward acting and other space-saving efficient doors. This very useful book contains details of construction and application. Kinnear Manufacturing Company.

37 **GLASS BLOCK** — Catalog IB-2. Reprint of Owens-Illinois section of Sweet's Architectural Catalog, giving complete information on the place of glass block in industrial design; description of designs and sizes; construction details; basic specifications; and test data. The Owens-Illinois Glass Co.

Conveyors, Cranes

38 **SOLVING HANDLING PROBLEMS** — 48-page book presents pictorially many solutions to industrial handling problems. Details and illustrations of equipment construction are included in a book that shows practical applications of materials handling in many diversified industries. American Monorail Co.

39 **CONVEYORS** — New catalog, "Conveying Away Your Case Handling Problems", features Scientifically Planned Portaflow Conveyors. Additional 28-page bulletin describes gravity conveyors and illustrates application with many installation photographs. Space also devoted to other type conveyors to combine with gravity type for an efficient handling system. Alvey-Ferguson Co.

40 **CONVEYOR GUIDE** — Contains valuable material handling data and over 100 illustrations of gravity and power conveyors, putting flow into production in a wide variety of industrial plants. Helpful information, ideas to reduce costs with conveyors, practical applications, latest developments. Of timely interest to plant operating officials and plant engineers. Catalog 35. Logan Co.

41 **OVERHEAD CONVEYORS**—Picture book of ideas for mechanical handling on overhead conveyors. Illustrations show handling from eggs to automobiles, including meat, castings, refrigerators, floor trucks and many others... moving products from where they are to where they are wanted . . . save floor space, avoid congestion, speed up production, etc. Link-Belt Company.

42 **METAL CONVEYOR BELTS** — 12-page catalog illustrates and describes two different types, Chain Link and Flat Wire. Explains their application to various materials handling and processing tasks. Pulleys, drives, one-way weave and right-and-left hand alternating weave also discussed. Cyclone Fence Co.

43 **COUPLINGS**—Data book on couplings for direct-connected machines, including conveyors, air compressors, cement mixers, pumps, generator sets and all types of production machines. Book tells how they provide positive drive; resilient flexibility; protection against misalignment; no noise, backlash or lubrication worries; and long life under severe conditions. Ajax Flexible Coupling Co.

44 **CRANES FOR ALL INDUSTRY**—Catalog C-3 has sections, covering different types of crane applications. These include Industrial, Mill Type, Grab Bucket, Gantry, Special Application and Trav-Lift cranes. Each section has illustrations, construction features and application of various models. Details of electrical equipment and crane accessories included. Also inquiry form for obtaining complete details and prices. Harnischfeger Corp.

45 **CRANES**—Bulletin 123 is profusly illustrated with photographs showing welded box girder crane and electric traveling crane. Other illustrations show essential parts such as trolley, trolley drive, brake, hoist-gearing, load block, etc. Short, descriptive paragraphs explain each feature. Shepard Niles Crane & Hoist Corp.

46 **LO-HED HOISTS**—Complete catalog describing hoists of many different sizes and capacities, as well as supplementary bulletins giving technical data and specification sheets for each type of hoist for each model. All material has been prepared so that plant men can easily specify the hoist best suited to their needs. American Engineering Co.

Dust Collectors, Precipitators

47 **DUST CONTROL** — Complete treatise, Book No. 22, on "Dustube" dust control, including handy technical data on the subject. Provided in an informative 24-page illustrated booklet sent free on request. American Foundry Equipment Company.

48 **FLY ASH AND DUST COLLECTION**—16-page bulletin discusses the removal of fly ash from flue gas. Photographs, line drawings and explanatory diagrams show the features and advantages of the Van Tongeren system. Additional 8-page folder deals similarly with this system as applied to dust collection, and explains the service of the Buell Testing Laboratory. Buell Engineering Co., Inc.

Electrical Equipment

49 **ELECTRICAL SUPPLIES** — New condensed catalog contains descriptions of Type A, C, and D Safety Switches; Industrial Control Equipment;

Using This Free Service!

Service and Meter Equipment; Fuses; and Cast Iron Service and Fuse Boxes. The Coltalog is designed as a quick reference book for electrical engineers, purchasing agents and executives. Helpful in specifying or purchasing electrical equipment. Colt's Patent Fire Arm Mfg. Co.

50 **UNIVERSAL TROL-E-DUCT**—12-page bulletin describing a Flexible Electrical Distribution System for Lighting. Every inch of Trol-E-Duct is a potential electrical outlet. By using Trolleys or Plugs, lighting units of any type can be quickly moved from one point to another or new units added at any particular spot desired. Bull Dog Electric Products Co.

51 **FUSES AND THEIR RELATION TO PLANT OPERATING COSTS**—Rb book on fuses—How to select renewable fuses—a concisely written treatise that shows the importance of fuse design in the elimination of useless shutdowns caused by needless blowing. Illustrated to show comparison and features of various types of fuse design. Bussmann Mfg. Co.

52 **ELECTRIC DISTRIBUTION**—Descriptive literature. MultibreakeR bulletin on low cost circuit breaker panels; Saflex bulletin on distribution panels; Square-Duct bulletin on flexible wiring systems; and the Switchboard bulletin. Square D Co.

53 **PRESSURE (SOLDERLESS) CONNECTORS**—For modern wiring on new or old work. Catalog No. 100 deals with 1800 time and labor saving solderless electrical connectors for plant maintenance, construction and extension. The Thomas & Betts Co., Inc.

54 **FEEDER DISTRIBUTION SYSTEMS**—Bulletin 165 completely describes and illustrates three systems of feeder distribution. Buss-Wa for distributing current by means of totally enclosed busbars; Flex-a-Power, a lighter form of Buss-Wa permitting insertion of heavy duty plugging devices; Trolley-Closur, a standardized system for supplying power to portable or moving electrically driven tools. Trumbull Electric Mfg. Co.

55 **SWITCHBOARDS, PANELBOARDS FOR HEAVY INDUSTRIAL CONSTRUCTION**—Catalog describes how this equipment fits the particular and often complicated industrial requirements, with ultimate savings to the user because of trouble-free, lasting service. Photographs illustrate the equipment. Frank Adam Electric Co.

56 **FUSES**—"The Inside Story of a Fuse"—a folder showing the advantages of knowing what is inside a fuse. Explains in detail salient features to look for when selecting a renewable fuse and the many advantages to be gained when using renewable fuses with non-interchangeable powder-packed tamper-proof renewal element. Trico Fuse Mfg. Co.

57 **CONNECTORS**—Bulletin is profusely illustrated with examples of connectors to meet varying conditions so that a permanent, tight connection is assured. Features of construction are shown. Two additional pocket-size folders illustrate and describe scale-free conduits, and wires and cables which have size, quality and footage clearly market on the insulation. National Electric Products Corp.

58 **BUSTRIBUTION**—24-page bulletin describing a flexible system of power circuits. Consists of interconnected sections of Duct in which Busbars are mounted and into which Branch Circuit Protective Devices may be "plugged" at points most convenient to motors or machines controlled. Plugs are readily removable to meet changes in layouts. Bull Dog Electric Products Co.

59 **GEARED DRIVES**—Profusely illustrated catalog describes all types of geared drives for all industries using electrical power. Single, double and triple reduction gearmotors; single and double reduction speed reducers; special vertical and right angle vertical geared drives; single and double reduction heavy duty mill units; horizontal speed reducers with shafts in vertical plane; geared drives for special problems and conditions; and open gearing are discussed. Westinghouse Electric & Mfg. Co.

Fence

60 **PROTECT PROPERTY**—Fences for the protection of industrial property. Fence Manual No. 100, a 48-page catalog with illustrations of several different types of fences and gates. Detailed specifications are given. Anchor Post Fence Co.

61 **FENCE FACTS**—A new booklet illustrating and describing chain link fence in a variety of styles and four different metals for every type of fencing installation. Also wrought iron fence in various beautiful styles. A concise handling of information for those wanting facts about fence. Page Fence Assn.

62 **PLANNED PROTECTION**—File-size manual contains valuable information on the protection of industrial property—the economic aspects, public liability, safety of property, insurance, etc. Includes data on various types of chain link fence construction, posts, gates and fittings—also contruction methods and cost factors. Continental Steel Corp.

63 **PROPERTY PROTECTION FENCE AND WIRE MESH PARTITIONS**—32-page book "Your Fence—How to Choose It—How to Use It" illustrates four kinds of fence. Tells how to choose the right kind to enclose business property, public property or a private estate or residence. Wire mesh partitions also illustrated and described. Cyclone Fence Co.

Flooring and Floor Maintenance

64 **FLOOR PLATE**—16-page illustrated booklet describes floor plate suitable for all heavy-duty flooring purposes, indoors and out. Shows how 4-way safety tread helps prevent the approximately 20% of industrial injuries caused by slipping and falling accidents. Also, how maintenance and repair costs are lowered and plant efficiency increased. Inland Steel Co.

65 **NON-SLIP FLOORS**—Catalog "C" contains complete information about Alundum Aggregate for terrazo non-slip floors and stairs, both monolithic and precast. Gives additional durability, prevents worn hollows where traffic concentrates and makes non-slip even when wet. Catalog "D" describes Alundum Aggregate for cement and asphalt floors. Complete specifications included. Norton Co.

66 **MAINTAINING FLOORS**—Newly revised booklet on "The Proper Maintenance of Floors". This complete informative guide tells you how to maintain your floors properly, economically and with a minimum of effort. West Disinfecting Co.

67 **STEEL FLOOR PLATE**—Literature shows the economy of "A. W." Rolled Steel Floor Plate, the modern industrial flooring, in terms of trouble-free floor protection. Five patterns illustrated. Complete engineering data. Alan Wood Steel Co.

68 **MAPLE FLOORING SPECIFICATIONS AND PERFORMANCE FACTS**—AIA file size folder containing grading rules, standard specifications which include data on laying and finishing floors, wearing qualities, thickness and grade uses. Also photographic folder prepared for the convenience of builder and engineers when discussing flooring grade requirements. Maple Flooring Mfrs. Assn.

69 **REPAIR CONCRETE TO A FEATHER EDGE**—Illustrated literature describes unique advantage of a durable, inexpensive material for repairing holes, ruts and broken concrete floors. Made with cellulose, it is easily applied, ready for use overnight and stands up under heaviest trucking conditions. For use indoors or out . . . for patches or over an entire area. Flexrock Company.

70 **FLOOR ARMORING**—Illustrated file folder describes economies of floor-steel. How it adds years of life to concrete, asphalt and mastic floors. Illustrates ease and economy of installation and how maintenance costs are eliminated by prevention of cracks, holes and ruts, and wearing effects of rolling loads. Installation data shows how floor steel can be applied in new or existing structures. Acme Steel Co.

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And the literature you want will be sent to you promptly without cost or obligation. No postage necessary

Food Dispensing

71 **FOOD CONVEYORS** — Booklet entitled "Human Beings at Work Consume Energy Constantly". Contains facts on benefits of "in-between-meal" food consumption by industrial workers, and describes line of "Ideal Food Conveyors" now being offered to industry by manufacturer of food cookers and food conveyors for the past 54 years. Swartzbaugh Mfg. Co.

Instruments and Meters

72 **TEMPERATURE CONTROLLERS AND RECORDING THERMOMETERS**—A thermometer catalog No. 1251, on the subject of temperature controllers and recording thermometers for industrial process temperatures such as furnaces, ovens, dryers, and continuous processes and for heating, ventilating, and air conditioning. This catalog contains timely and interesting engineering information concerning the control of temperature. The Bristol Company.

73 **INDUSTRIAL TEMPERATURE GAUGES** — 12-page illustrated booklet contains complete information about new all-metal thermometers, general purpose and heavy-duty types. Specifications given for accuracy, head design and diameters, scale lengths, ranges, connection nuts and stem lengths. List prices of all standard gauges supplied for ranges from −40 deg. F. to 1,000 deg. F.; for stem lengths from 2½ in. to 24 in. Weston Electrical Instrument Corp.

74 **RECORDING AND CONTROLLING FLOW METERS**—40-page catalog, No. 1051, contains engineering data on Theory and Practice of Modern Day Measurement of Fluids by Means of Electric and Mechanical Flow Meters. Liberally illustrated with line drawings to show principle of operation and method of installation. Contains information on preventing wastes in use of steam, water, air, gas, oil, etc. The Bristol Company.

Lighting

75 **FLUORESCENT LIGHTING**—Fluorescent lighting units for industrial locations. New Device Announcement No. 561, Benjamin Dayliter and New Device Announcement No. 581, Benjamin Flur-O-Line, give full descriptions, list prices and other data. Benjamin Electric Mfg. Co.

76 **STOCK BIN ILLUMINATION** — 12-page illustrated bulletin dealing with the important problem of good illumination for shelves and bins in warehouses and stockrooms. It explains how this specialized illumination makes possible faster and more accurate handling of orders. Bulletin No. 91. Goodrich Electric Company.

77 **FLUORESCENT LAMP** — 8-page bulletin, No. 522, introduces new 100-watt Cooper Hewitt fluorescent lamp for general industrial lighting. Discusses features of the lamp, high output, high efficiency, long life and cool light source. Bulletin contains complete specifications of the new lamp, as well as a foot candle table and photometric rating chart. General Electric Vapor Lamp Company.

78 **LIGHTING MANUAL**—Invaluable to everyone who specifies, purchases or sells industrial lighting reflectors. Tells purposes of and details standards which assure maximum lighting performance. RLM Standards Institute.

79 **LIGHTING FIXTURES FOR FLUORESCENT LAMPS**—New bulletin describes Fluorescent lamps, auxiliaries and complete line of industrial lighting fixtures for use with the Fluorescent Daylight Lamp. Fixtures are unparalleled for inspection, fine assembly, color-matching work, etc. Bulletin also contains Typical Comparative Footcandle Data and information about special applications. Wheeler Reflector Co.

Lockers, Shelving, Boxes, Etc.

80 **TOOL STORAGE**—Bulletin just issued gives detailed description of most complete line of steel tool room equipment. Provides safe storage, accurate stock keeping, and convenience in handling for tools of every description. Several typical tool room layouts are also included. Lyon Metal Products, Inc.

81 **LOCKERS**—New booklet illustrates and describes construction features important to the durability of any locker. Describes many types of lockers (single tier, multiple tier, box compartment, etc.) and their individual industrial uses. Points out importance and benefits of planned arrangements, footings, recessing, backing up, etc. Also economies to be made by proper installation. All-Steel-Equip Co.

This card must be filled out completely in order to secure the literature you request. Please circle only those bulletins in which you are particularly interested.

Maintenance Tools and Equipment

82 **PORTABLE ELECTRIC TOOLS**—Newest 48-page catalog illustrates and describes complete line of Thor portable electric drills, screw-drivers, nut-setters, grinders, sanders, polishers, saws, hammers, attachments and accessories. Full information on capacities, speeds, sizes and prices. A compact guide for the portable electric tool user. The Independent Pneumatic Tool Co.

83 **DOLLARS AND SENSE OF MODERN CLEANING FOR INDUSTRY** —A new booklet about proper "housekeeping" procedure. It gives the formula for greater plant cleanliness at lower cost. Case histories are included. The three Invincible Portable Vacuum Cleaners most widely used by industry are described. Invincible Vacuum Cleaner Mfg. Co.

84 **STEAM CLEANING** — Illustrated folder showing advantages and uses for Hypressure JENNY steam cleaning in industrial plants. Folder is accompanied by charts and a request for free survey, so you can determine without obligation the money saving possibilities for Hypressure JENNY in your own plant. Homestead Valve Mfg. Co.

85 **WHAT'S NEW IN PORTABLE ELECTRIC TOOLS**—Catalog No. 66, 52 pages, describes and illustrates Safety Saws, Drills, Hammers, Unisheārs and other portable electric tools for production, new construction, and maintenance jobs in every plant. Complete specifications and prices. Stanley Electric Tool Division.

86 **VACUUM CLEANING FOR INDUSTRY**—Bulletin 120F illustrates results to be obtained with a Spencer Vacuum System, cleaning large areas at low cost, saving in production and maintenance. Also describes Spencer Portable and Central Systems from 1/3 H.P. up, and Industrial Vacuum tools. Spencer Turbine Co.

87 **CARE OF INDUSTRIAL FLOORS** —New literature describes and illustrates the various floor machines and mop trucks (40 different models), waxes, powders, sealers, and accessories. Provides an answer to every floor preservation, sanitation and maintenance problem, with special attention given to the care of industrial plant floors. Finnell System, Inc.

88 **CEMENT FLOOR CLEANING, MACHINERY CLEANING** — Two descriptive folders. One shows cleaning, whitening and hardening of cement floors in one easy, safe and economical operation. Other illustrates unique material for cleaning plant machinery, floors, and cold tank cleaning of parts. Also, cleaning in fleet maintenance, motor, and chassis cleaning, body washing. Valuable aids for cleaning problems. Magnus Chemical Co.

89 **PORTABLE POWER TOOLS**—Fully illustrated 56-page catalog on portable electric tools for construction, maintenance, and production purposes. Individual sections devoted to handsaws, drills, belt sanders, disc sanders, grinders, blowers, and floor sanders. Each section illustrates various models, gives specifications, prices, and construction features. Opening pages illustrate practical uses. Skilsaw, Inc.

This descriptive material is continued on pages B 143, B 144, B 146, B 148, B 150, B 152.

Paint, Painting Devices

90 **PAINT**—Manual on the characteristics, uses and applications of Permite Ready-Mixed Aluminum Paints. Covers the uses and application of Permite Outdoor, Indoor, High Heat-Resisting, Quick Drying, Product Finishing, and other specific types which comprise the complete line. Prepared as a reference book for large users of aluminum paint. Aluminum Industries, Inc.

91 **METAL PROTECTIVE FINISHES**—An entirely new book dealing with the need for protecting various types of metal surfaces against corrosion. Also contains a discussion of the proper metal protective finishes to use in protecting metal surfaces against varying normal and abnormal exposures. Pittsburgh Plate Glass Co.

92 **BRUSH FACTS**—Interesting and informative story on history of brush making. Clearly develops the reasons for the vast difference in quality of brushes. Booklet will give you data every plant operating official should have as a guide in the selection of paint brushes for fast work and low maintenance costs. Pittsburgh Plate Glass Co., Brush Div.

93 **ECONOMY IN MAINTENANCE PAINTING**—Master Specifications for Industrial Paints, a valuable aid in developing an efficient maintenance painting program to reduce cost per square-foot-year. Contains equally valuable data for painting new structures, from the shop and field costs for steel to the exterior and interior of finished buildings and other plant structures. Joeph Dixon Crucible Co.

94 **INDUSTRIAL PAINT**—"An Analysis of Plant Conditioning" — 34-page illustrated booklet of case histories, illumination and light reflection factors, application data and paint facts. Includes a graphic painting maintenance guide listing specific types of paint most suitable and economical for both plant and equipment. The Sherwin-Williams Co.

Plant Location

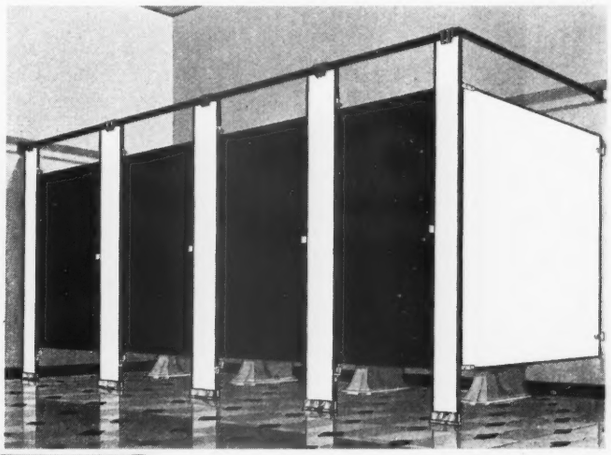
95 **INDUSTRIAL MARKET** — Factual data on manufacturing and distribution advantages of Los Angeles County as location for industry, serving Pacific Coast and Western States. Of particular interest to sales executives selling in western markets. Los Angeles Chamber of Commerce.

96 **OPPORTUNITY FOR INDUSTRIAL LOCATION**—Facts available concerning locating in the New York Metropolitan area, economies derived, trucking facilities, major highways, railroads available, water transportation, cooperation with industry, etc. Literature discusses advantages of area for economy of production and distribution. Hoboken Industrial Committee.

97 **PLANT SITES**—Descriptive folder on available plant sites, labor, power, water supply, raw materials, transportation facilities and adjacent industries, etc. in connection with an industrial location on tidewater in the Middle Atlantic Seaboard. Coastwise and foreign shipping facilities. Large maps help to visualize the location and illustrate the size of surrounding market. Hopewell, Va.

(Continued on page B 144)

STEP UP EMPLOYEE MORALE . . . WIN RESPECT AND GOOD WILL . . . WITH MODERN TOILET ROOM ENVIRONMENTS!



"THE ACADEMY"
An installation of Sanymetal Toilet Partitions similar to this one is included in the plant of The Standard Register Co., Dayton, Ohio. This modern design, available in either gleaming porcelain enamel or baked-on paint enamel finishes, is particularly suitable for employees' toilet rooms.

"THE FLUSH TYPE"—A sturdy, economical design widely used for modernizing present toilet rooms. Available in baked-on paint enamel finishes.

"THE FULL PANEL TYPE"—A conservative design noted for its ability to withstand rough treatment. Available in baked-on paint enamel finishes.

LARGE EMPLOYERS are making modernization of toilet rooms a major part of their employees relations program. The adequacy and convenience of toilet room facilities have a salutary effect on employee morale . . . induce "good feeling" toward management and indirectly contribute to production activity.

Sanymetal Toilet Partitions, of which there are three types especially suitable for factory installations, create toilet room environments that promote cleanliness and sanitation...protect health...contribute in every way to workers' comfort, and bring to management a feeling of satisfaction over having provided such facilities.

Sanymetal Porcena "Academy" Toilet Partitions—in gleaming, ageless, porcelain enamel—offer the utmost in permanence of finish, and years of sanitary service. Sanymetal Flush Type and Full Panel Type Toilet Partitions—with baked-on paint enamel finishes—offer an adequate means of modernizing present toilet rooms on a more conservative basis. All three types are unmatched for sturdy strength, dignity of design, and simplicity of construction—features which insure more years of sanitary service.

The Sanymetal Representative nearest you will be glad to assist in planning suitable toilet room environments for old or new factory buildings. Consult him, but write for Sanymetal Catalog No. 76 showing all types of Sanymetal Toilet Partitions.

THE SANYMETAL PRODUCTS CO., INC.
1707 Urbana Road • • Cleveland, Ohio

Sanymetal
TOILET AND OFFICE PARTITIONS

NITROSE SAVES

1—Expensive preparatory work
2—The cost of a second coat
3—60% to 70% on labor required

PROTECTS METAL SURFACES AGAINST { CORROSION, ACID FUMES, ALKALIES, EXTREME TEMPERATURES

WRITE

MADE ONLY BY
THE NITROSE COMPANY, INC.
PEORIA, ILL., U. S. A.

PLAGUE!

NO ONE IS IMMUNE TO "WASHROOM INFECTION"

HERE'S how to get more "man hours" per man . . . more profit per job. Keep employes healthy by making washrooms sanitary with Onliwon Towels and Tissue.

This modern service helps check the spread of contagious disease. Locked, sanitary cabinets guard both towels and tissue against waste, theft, and contamination.

Ask your local A. P. W. distributor about this *safe* way to cut washroom costs. Or write to A. P. W. Paper Co., Albany, N. Y.

A.P.W.

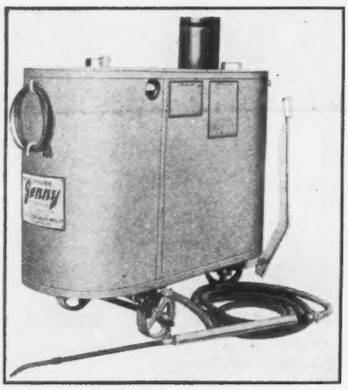
Onliwon Towels and Tissue

The economy washroom service

HYPRESSURE JENNY

CLEANS FLOORS
6 times cheaper
6 times faster, and
SAVES $4500 a year!

FOR THIS MANUFACTURER



Oliver Iron & Steel Corporation uses Hypressure Jenny Steam Cleaning for plant-floor conditioning. They save $4,614 annually over hand-cleaning methods. With Hypressure Jenny, cleaning costs dropped from $1.53 to $.26 per 100 sq. ft.—investment was repaid 9 times the first year—better cleaning than ever before resulted. You can make similar savings on cleaning jobs in your plant. Ask us to prove it.

Mail THIS COUPON FOR FREE SURVEY

We have.....men employed in maintenance
We clean.....pieces of machinery monthly.
We clean.....sq. ft. of industrial windows annually.
We want to clean ☐ small tools, ☐ machines, ☐ cranes, ☐ runways, ☐ floors, ☐ walls.

Name .....

Address .....

HOMESTEAD VALVE MFG. COMPANY
P. O. Box 86, Coraopolis, Pa.

(Literature listings, cont.)

98 **OFFER TO INDUSTRY**—16-page folder, complete with maps. Shows industrial opportunities and advantages found in communities in 29 states served. Complete information can be supplied on labor, transportation, raw materials, taxes, and other subjects of interest to manufacturers. Associated Gas & Electric System.

99 **INDUSTRIAL SITE**—Circular describes 21 acre, unimproved industrial tract in St. Louis, Mo. Details given as to location, railroad trackage and main highways. Breit & Naumer.

100 **LOCATION FOR INDUSTRY**—Literature concerning advantages of a southern location for industry. Describes transportation facilities, natural resources, economical living and production conditions. Information points out opportunities for many industries. Pensacola, Fla.

101 **INDUSTRIAL LOCATION** — Middlesex County, New Jersey, with such communities as New Brunswick and Perth Amboy, offers complete facts on an area centrally located for Eastern markets. Four main line railroads, highways, ocean vessel wharfage and other transportation facilities. Literature gives information on taxes, labor, cost of living and utility rates. Of great interest to executives. Middlesex County, N. J.

102 **SITES FOR INDUSTRY**—Numerous folders describing plants and plant sites available for sale or lease. Information given as to location, construction features in case of plants, labor supply, transportation facilities, etc. Each folder illustrated to show building or plant site. Kislak, Inc.

103 **INDUSTRIAL SERVICE** — Information available concerning reduction of taxes and electric rates; liquidation of plants and equipment; appraisal of market value of plants, property and equipment. Each is discussed in a separate section giving methods and procedure of handling typical cases. Hasco, Inc.

Plant Protection Equipment

104 **INDUSTRIAL FIRE PROTECTION SERVICE**—Two new, well illustrated booklets describing latest improvements in two types of fire extinguishers. One with penetrating gas that smothers fire instantly. Particularly valuable for protection of all electrical and flammable liquid hazards. The other, a new pure water approved extinguisher not requiring annual recharging. Walter Kidde & Co.

Roofing and Roof Maintenance

105 **REFERENCE MANUAL FOR ARCHITECTS AND ENGINEERS**—Specific information and specifications for built-up roofing, flashing, roof drainage, waterproofing and dampproofing, based upon 85 years unmatched roofing and waterproofing experience. Manual stiff-covered with 68 pages conveniently arranged and profusely illustrated with construction diagrams and photographs. A standard reference manual. The Barrett Co.

(Continued on page B146)

YOU'D THINK THE SEA WOULD GET TIRED...

trying to burst the Maine coast's granite barriers.

And you'd think that rain and sleet and snow would get tired of trying to spring a leak in a Barrett Specification Roof. For the principal ingredient of Barrett Roofs is nature's greatest bituminous waterproofing agent—straight-run coal-tar pitch. *It is actually preserved by water!*

When this pitch—refined by The Barrett Company from the finest crudes obtainable—is combined with pitch-saturated Barrett Specification Felt into a Barrett Specification Roof, you have a roof that knows no equal for lasting, trouble-free performance.

Barrett Specification Roofs are applied only by Barrett Approved Roofers according to time-tested Barrett Specifications which have become the standard of the building industry.

Why risk disappointment and expense due to roof failure when it is so easy to get a genuine coal-tar pitch and felt Barrett Specification Roof?

THE BARRETT COMPANY
40 Rector Street, New York, N. Y.

2800 So. Sacramento Avenue, Chicago, Illinois
Birmingham, Alabama

In Canada: The Barrett Company, Ltd., Montreal, Que.

*Trade-mark of the Barrett Co. Reg. U. S. Pat. Off.

*Barrett Specification Roofs**

Let us make an inspection of your present roofs. This service is free and has saved many building owners many thousands of dollars. Phone, wire or write our nearest office today.

AMERICA'S LEADING MANUFACTURER OF COAL-TAR PRODUCTS. ROOFINGS. TARVIA. CHEMICALS.

Modernize your PLANT VENTILATION

FOR Greater SAFETY Efficiency Better LABOR Relations

Men are more alert when they breathe *fresh* air—production efficiency is definitely increased—safety factor is noticeably higher—satisfaction with working conditions is raised.

"Fresh Air is FREE with Allen"

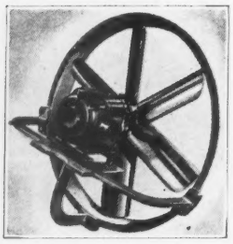
Install Allen Multi-Vane Turbine Ventilators on your plant according to scientifically engineeered plan, and the ventilation job is permanently solved—automatically done day and night. There is an ALLEN Ventilator to suit every industrial job. Let our engineering department consult with you on this vitally important matter. Conference and plans without obligation. The graceful, symmetrical lines and pleasing appearance of Allen Turbine Ventilators modernize old buildings or harmonize with the modernistic trend of new plants.

Allen Ventilators,—the original turbine ventilators,—have been built for more than twenty years and used throughout the world on leading factories, auditoriums, ships and shops. They are made of finest materials, expertly engineered, and have the reputation of outlasting the building on which they are installed. For high utility and long life, specify ALLEN Turbine Ventilators!

Allen Ventilators for every need:

MULTI-VANE: The famous "Free Air" Allen Turbine Ventilator which gives cost-free powerful suction, and is the standard installation for most ventilating jobs.

ELECTRO-WIND: Operates on air power the same as style #1, but has auxiliary electric power available to double the exhaust when required by unusual conditions.



EXHAUST FANS: of highest engineering design, workmanship and materials. Aluminum alloy propeller (4 or 6 blades) balanced dynamically for smooth operation and freedom from vibration. Totally enclosed ball bearing motors. Maximum air delivery per watt. Ask for complete catalog of Allen ventilation equipment.

The ALLEN Corporation

9763 Erwin Ave. Detroit, Michigan, U. S. A.

Valuable Literature

on location, construction, modernization, and maintenance of industrial plants is available to you without cost or obligation.

See special Reader's Service insert page B139

(Literature listings, cont.)

106 ROOF DECK — 4-page booklet shows use and application of steel roof deck. Indicates how ends of sections are nested one into the other, effecting an economical, easily erected, unusually strong roof construction. Booklet is complete with construction details which involve a number of different applications. Milcor Steel Co.

107 ROOF TRUSSES—Folder describes their construction and uses, illustrating how these bowstring trusses provide a strong, safe and economical roof construction while allowing for clear, unobstructed floor space, 3-pages of line drawings show various types and sizes. Specifications and standards given. Summerbell Truss Co.

108 MAINTENANCE — FREE ROOFING AND SIDING — Booklet describes Corrugated Asbestos-Cement Sheets for application directly over skeleton steel framing. Shows how this material is unaffected by acid fumes—is fireproof and rotproof. Saves money on maintenance costs. Prominent installations illustrated. The Ruberoid Co.

109 ROOFING SPECIFICATIONS — New edition gives complete specifications, illustrated by diagram, for all types of coal tar pitch and tarred felt roofs. Also, for applications over wood decks, concrete or poured gypsum, precast concrete or gypsum, book tile, steel deck or under promenade tile. Other sections deal with insulation, flashing specifications, etc. Koppers Co.

Sanitary Facilities

110 GROUP WASHING FIXTURES—Attractive catalog, profusely illustrated, describes modern washroom equipment including washfountains, group showers, and group showers with dressing rooms, expressly designed for industrial use. Exclusive features, advantages and construction are given, plus installation photographs and blueprints of typical locker room layouts. Also, description of drinking fountains, specifications and types available. Bradley Washfountain Co.

111 WATER COOLERS—New, twelve-page Water Cooling Catalog, printed in three colors, illustrates and describes all models which comprise the 1939 Frigidaire line. Cutaways are shown of each series and leading features are spot-lighted. Models are shown which meet every office and industrial requirement, regardless of size. Frigidaire Div. G-M Corp.

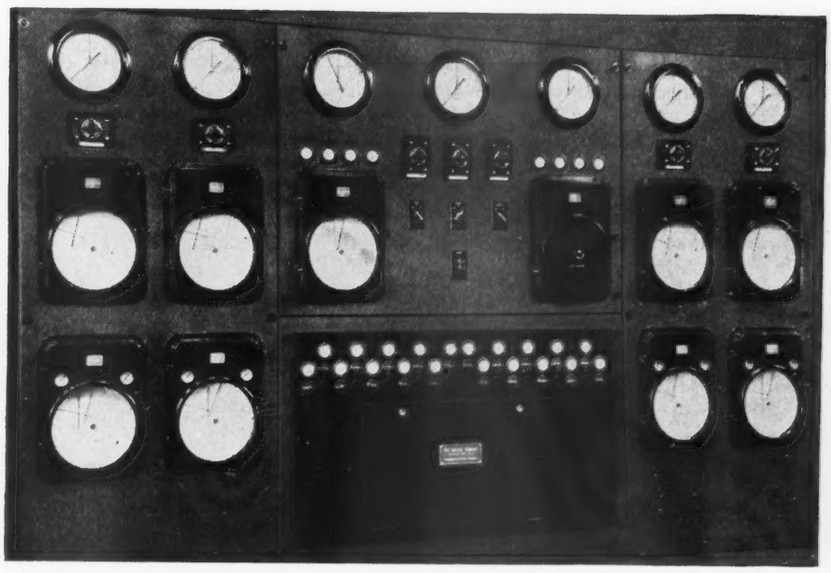
112 HEAT-FAG COMBATED WITH SALT—Folders deal with the cause and result of insufficient salt in the system. Pertinent questions pertaining to the subject of Heat-Fag are answered in detail . . . explaining what it is . . . and presenting a convenient, practical way of dispensing salt tablets as a preventative to lost time and lowered production. Morton Salt Co.

113 WASHROOM SUPPLIES — Literature describes how the vital problem of good employer and employee relations can be helped by properly equipped washrooms. Explains advantages of using high quality paper towels and paper supplies. A.P.W. Paper Co.

(Continued on page B 148)

NOW...your plant output CAN BE THE SAME

—in every way, one day as another!



Another feature of BRISTOL'S SYSTEM OF COORDINATED PROCESS CONTROL that helps you end rejects, cut costs, improve quality

To production executives who are confronted with such annoying problems as maintaining plant output constant, holding quality within the permissable tolerances of consumer acceptance, eliminating rejects, keeping costs within bounds, putting processing on an unchanging time schedule —Bristol's System of Coordinated Process Control offers an aid that is almost amazing!

It provides *complete automatic process control.* From the very beginning of your cycle right through to the end—no matter how intricate it may be or how critical the operations involved—every step, every action such as opening and closing valves, starting and stopping motors, every variable such as temperature, level, or pressure is controlled and coordinated *completely* and *automatically.*

Bristol's System of COORDINATED PROCESS CONTROL

In plants in which Coordinated Process Control is now in use, production is attaining new standards of performance. One company reports 100% increased output. Another says "tensile strength is up 17%." A third finds that one operation which formerly took 168 hours is now completed in ½ hour!

A modern trend that is of far-reaching significance, Coordinated Process Control is a development you will want to know about. Bulletin 460-511F gives the complete story. Write for a copy.

In Wide Use Today

This modern technique of process control is now being used by some of the most progressive and successful manufacturers in the country.

More Than Just Instruments

Bristol's System of Coordinated Process Control is made possible *only by the combination* of (a) the ability, experience and facilities of the Bristol's engineering staff to apply to a given plant problem a simplified layout of modern instruments providing complete coordinated process automaticity, (b) Bristol's Process Cycle Controller, the "mechanical brain" of coordinated process engineering, and (c) the complete line of Bristol's controlling, recording and indicating instruments for pressure, level, temperature, humidity, flow, motion, electrical quantities, etc., —a complete service backed by Bristol's undivided responsibility.

THE BRISTOL COMPANY
WATERURY, CONNECTICUT

Branch Offices: Akron, Birmingham, Boston, Chicago, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle. Canada: The Bristol Company of Canada, Limited, Toronto, Ontario. England: Bristol's Instrument Company, Limited, London, N.W. 10

INDUSTRY'S GUIDE TO A UNIFORM PRODUCT

Section of washroom of precision tool manufacturing plant equipped with Bradley 54-inch circular Washfountains.

In the Finest Machine Tool Plants

You Find CLEAN WASHROOMS—*AND* BRADLEY WASHFOUNTAINS

● Bradley Washfountains serving as many as ten at one time, eliminate waiting and delays,—give each washer his own spray of clean, running water.... They promote cleanliness—reduce chance of skin affections.... They are self-flushing and permit no water to gather in the bowls.... Space is saved—water costs cut 70%.—They reduce the amount of piping connections per person,—and are practically indestructible. You can install Bradleys in old or new buildings—pay for them out of savings alone.... Let our washroom consultants make recommendations, or, write today for typical layouts of washroom drawings. ... BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee, Wis.

BRADLEY WASHFOUNTAINS

Ideas for planning modern sanitary washrooms are contained in a collection of 12 typical layout drawings—sent free on request.

FREE! *FOR THE ASKING*

Valuable literature on location, construction, modernization, and maintenance of industrial plants is available—no cost or obligation.

←←← *Turn to page B139*

(Literature listings, cont.)

114 **INDESTRUCTIBLE TOILET SEATS**—Descriptive folders show how industrial maintenance costs can be reduced by use of Church Mol-Tex, new white molded toilet seat, and Church Sani-Black hard rubber toilet seats. Complete information includes illustrations of the many construction features of these indestructible and incomparably sanitary toilet seats. C. F. Church Mfg. Company.

115 **WATER COOLERS**—Bulletin describes advantages of water coolers for improved relations with employees, customers and visitors. Four models illustrated with detailed specifications and list of features. Tables offer a convenient guide to determining drinking water costs, capacity requirements and other important items difficult to figure accurately. Westinghouse Electric & Mfg. Co.

116 **PLUMBING FOR INDUSTRIAL AND COMMERCIAL BUILDINGS**—Contains valuable information on the solution of industrial sanitation problems. Offers practical help in selection of proper sanitary equipment. Read this booklet to understand the vital requirements of modern factory sanitation and to know the advantages gained by choosing plumbing materials specially designed for industrial use. Crane Co.

117 **WASHROOM ADVISORY SERVICE**—How to improve washroom conditions in plants or offices told in booklet "Scott Washroom Advisory Service." This booklet highlights practical suggestions, indicating how overhead may be cut, how scientifically arranged washrooms relieve congestion, reduce waste, and overhead expense. Scott Paper Company.

118 **TOILET ROOM ENVIRONMENTS**—Catalog No. 76 illustrates and describes new and important developments in creating toilet room environments which engender employee confidence and build good will. This 20-page, 3-color booklet gives complete suggestions for modernizing toilet room environments; suggestions for layouts, decorations and other helpful information. The Sanymetal Products Co., Inc.

Shading

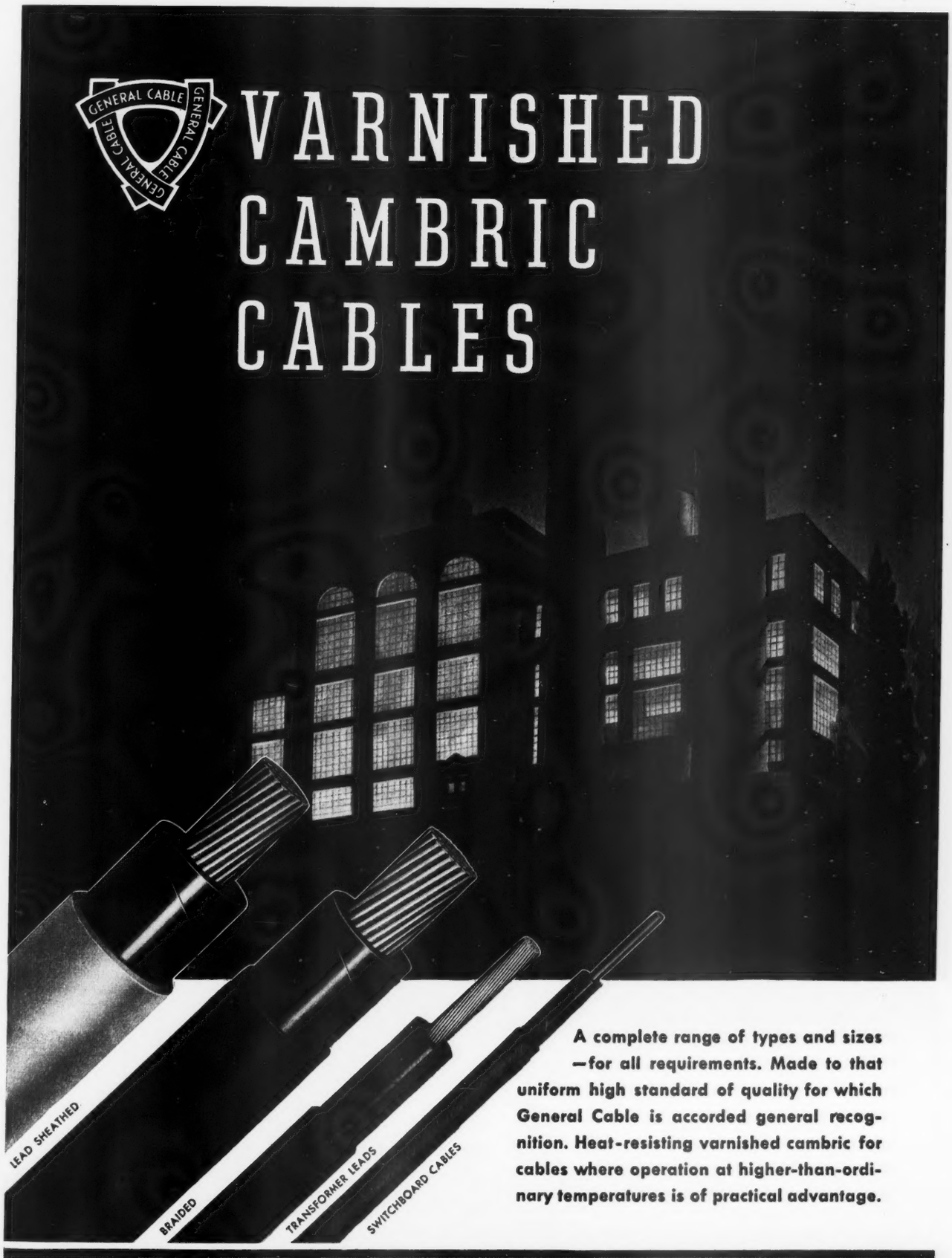
119 **HEALTHY, VIGOROUS, CLEAR THINKING WORKERS** — Illustrated folder describes how to obtain up to 40% more light without drafts, increasing efficiency of workers and output of plant. Special equipment devised to take care of every type of industry, textile mills, laundries, silk spinning, other industries requiring high relative humidity and plants that have devastating acid fumes present. Shading for all types of office and factory windows. Monitors and skylights. Hough Shade Corp.

Valves, Piping

120 **PHOTOFACTS** — An exhaustive photographic study of Iron Valves —analyzing the factors of valve life and maintenance—shows how you can effect sizable savings in repair and replacement on your "big" lines—at no extra cost. Jenkins Bros.

(Continued on page B 150)

VARNISHED CAMBRIC CABLES



A complete range of types and sizes —for all requirements. Made to that uniform high standard of quality for which General Cable is accorded general recognition. Heat-resisting varnished cambric for cables where operation at higher-than-ordinary temperatures is of practical advantage.

GENERAL CABLE

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT
KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N. Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D. C.)

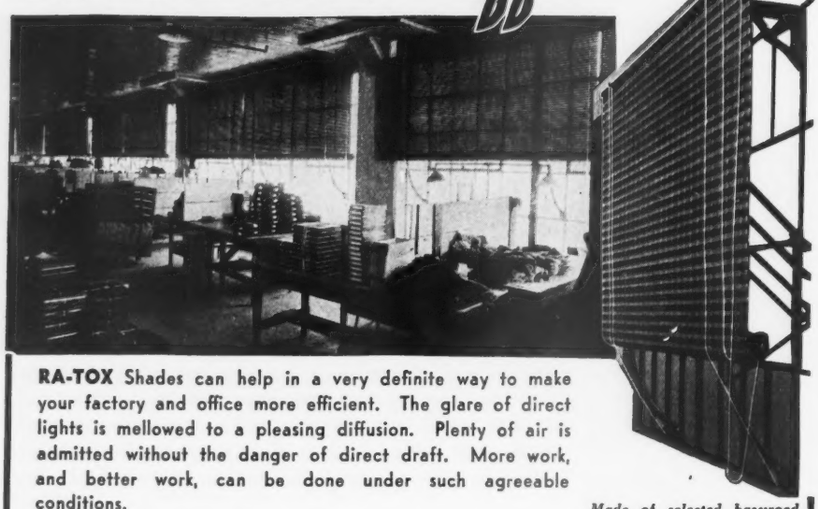
PAGE FENCE

Product of Page Steel & Wire Division, American Chain & Cable Company, Inc.

YOU'RE LOOKING AT A FENCE POST WITH WINGS

Yes—a fence post with wing channels, originated by PAGE and designed especially for chain link fence fabric and resulting in greater strength and utility. This post, a PAGE contribution to better protection, is only one of many exclusive advantages. 56 years of fence service is available through one of our 92 Association Members—a locally responsible firm interested in serving you. Secure his name and free literature—write PAGE FENCE ASSOCIATION, Bridgeport, Conn.

RA-TOX FOR *efficiency*



RA-TOX Shades can help in a very definite way to make your factory and office more efficient. The glare of direct lights is mellowed to a pleasing diffusion. Plenty of air is admitted without the danger of direct draft. More work, and better work, can be done under such agreeable conditions.

RA-TOX Shades have proved their efficiency in leading factories throughout the country. They are available in narrow splints as well as standard width; square-edge splints and bevel-edge splints; and in three finishes—stain, metallic aluminum, enamel.

Write us today and let us show you by word and picture how **RA-TOX** Shades have benefited many factories and offices, and how they give service for years and years.

Made of selected basswood strips, woven parallel with hard twist seine twine; attractive, fast colors add smart, business-like appearance.

HOUGH SHADE CORPORATION
1043 Jackson St., Janesville, Wis.
Send complete RA-TOX details at once.

Name.....
Address.....
City.....
State.....
☐ Steel Sash ☐ Wood Sash

(Literature listings, cont.)

121 PIPE FOR INDUSTRIAL USES—Bulletin 337—a 42-page catalog filled with useful facts about Spiral Welded Pipe, supplemented by large, easy-to-read charts and tables. Explains how to determine pipe size and wall thickness; estimate pumping costs; eliminate unnecessary flanges, etc. Includes data on protective coatings, various types of joints, recommended methods of installation. American Rolling Mill Co.

122 BOILER TUBES—12-page folder describes process of making seamless steel boiler tubes designed for economy, safety, and durability. Tables show weight, thickness, diameter, etc. for various sizes. Numerous pages discuss standard specifications, including various tests, chemical composition, weights, workmanship, marking and inspection. Jones & Laughlin Steel Corp.

123 WHENEVER PIPING IS INVOLVED—Fully illustrated 20-page book on Prefabrication of Welded Piping . . . dependable and economical method of meeting the exacting requirements of power and process piping, tells the story of complete facilities and installation data for various types of plants. A good reference book on industrial piping. Grinnell Company, Inc.

Vibration Control

124 CONTROLLING VIBRATION TRANSMISSION — Illustrated booklet on control of vibration transmission, and leaflet outlining new method of machine installation, labor-saving through elimination of hold-down bolts and drilling. Method makes for easily altered production line setup. Felters Co., Inc.

125 VIBRATION CONTROL—Typical installations show what can be done in the elimination of vibration transmission, with consequent lessening of wear on machines and buildings, and corresponding higher production under more efficient working conditions. The 16-page bulletin describes materials used in isolating vibration and their widespread application in industry. The Korfund Company, Inc.

Wire, Cable and Wiring Devices

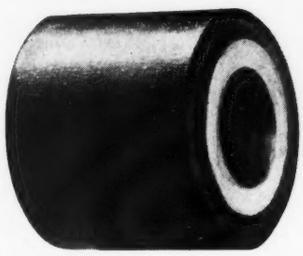
126 TIREX CORDS AND CABLES—Bulletin No. 994 illustrates and describes the complete line of rubber sheathed, flexible cords and cables for portable electric tools and machines. Construction details together with O.D. and weights are given. Also illustrated in this 64-page catalog is the proper method of making splices in rubber sheathed cables. Simplex Wire & Cable Co.

(Continued on page B 152)

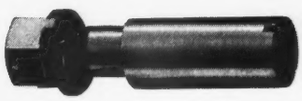
SECRETS OF AJAX RELIABILITY

What Every Plant Man Wants to Know About
FLEXIBLE COUPLINGS

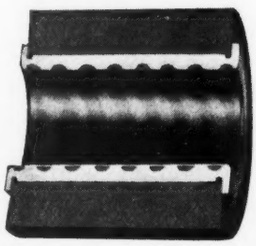
The difference in Flexible Couplings consists of two things, (1) Design, (2) Performance. Why risk the reliability and reputation of expensive, productive direct-connected machines as well as costly shut-downs by using anything but the best flexible couplings? Check these pictures and see why Ajax Flexible Couplings *stand up best!*



Ajax Rubber Bushings absorb misalignment. Bushing cold-vulcanized to bronze bearing and flange,—no friction, scuffing, shear or wear on rubber.



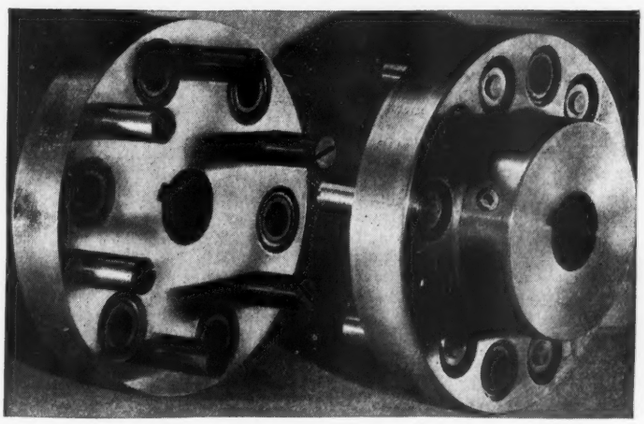
Alloy steel studs hardened and ground insure accuracy. No noise, no backlash. Positive drive . . . No metal flexing parts to wear or fatigue.



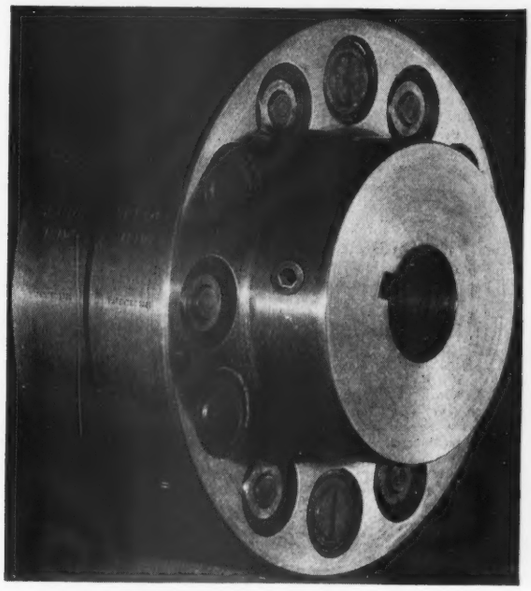
Cross section showing rubber bushing and flanged graphite-bronze, self-lubricating bearing.

You Can Throw Away Your Oil Can When You Use AJAX FLEXIBLE COUPLINGS

Ajax graphite-bronze bearings and hardened alloy steel studs require no lubrication. They simply carry driving load,—only friction is slight end-float.



Showing two Ajax Flange assemblies before mating. Installation and maintenance men customarily line up machines by means of coupling flanges, thanks to Ajax accuracy!



Above: Showing compact, rugged Ajax design. You get positive drive, resilient protection against misalignment, free end-float and dielectric insulation between driving and driven machines. Built in a complete line including Shear Pin Type.

WHETHER YOU BUILD OR OPERATE PLANTS

You will find Ajax Flexible Couplings "life insurance" for direct-connected machinery. They are flexible connecting links between driving and driven units of cement mixers, air compressors, pumps, conveyors, generator sets, as well as all types of production machinery.

Write for the Ajax Data Book giving complete working data on all sizes and types.

AJAX FLEXIBLE COUPLING CO.

62 English St. Westfield, N. Y.

Incorporated 1920

Akron, Ohio	Cincinnati, Ohio	Los Angeles, Cal.	Pittsburgh, Pa.
Atlanta, Ga.	Cleveland, Ohio	Louisville, Ky.	St. Louis, Mo.
Boston, Mass.	Dallas, Tex.	Milwaukee, Wis.	San Francisco, Cal.
Buffalo, N. Y.	Detroit, Mich.	Minneapolis, Minn.	Spokane, Wash.
Chicago, Ill.	Indianapolis, Ind.	New York City	Stuttgart, Ark.
	Kansas City, Mo.	Philadelphia, Pa.	Syracuse, N. Y.

Also Manufacturers of Reciprocating Shakers and Screens

FOR THE "MESSY" CLEANING JOBS IN YOUR PLANT

There are messy and difficult jobs in any manufacturing plant. You have them, too. Such jobs as—removing oil, grease and muck from machinery and parts (on the floor or in the repair shop)—cleaning inaccessible equipment and locations—washing painted surfaces—cleaning and keeping clean stained, greasy floors.

MAGNUSOL

is the economical and effective answer. It takes the "cling" out of oil and grease. Easy to use—you simply brush or spray it on—then flush it off with water. No heat needed.

MAGNUSOL is safe—nonflammable. Harmless to skin, hands, painted surfaces, cement. And it does a perfect job.

SPECIAL INTRODUCTORY TRIAL OFFER

You will find many profitable uses for MAGNUSOL in your plant. Let us send you a trial drum. If you are not completely satisfied after 30 days, send back the unused portion for full credit on the entire drum.

MAGNUS CHEMICAL COMPANY

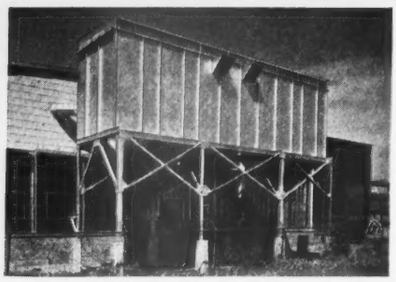
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants

220 South Avenue Garwood, N. J.

MAGNUS CLEANERS

SETTLE Your Dust Problem this Simple, Economical Way

Write for free book No. 22 on "Dustube Dust Control"



If you're looking for the answer to complete dust control at lowest cost—we have it in "Dustubes". They're approved by all state health boards—they require little attention—and they are extremely easy on the purse strings both in initial cost and upkeep. That's why they are used in such plants as Ford Motor Co., General Electric Co., The Glidden Co., Monsanto Chemical Co., Timken Roller Bearing Co., etc. Write for information today.

The American Foundry Equipment Co.

374 South Byrkit St. Mishawaka, Ind.

American "DUSTUBE" DUST COLLECTOR

(Literature listings, cont.)

127 INDUSTRIAL WIRING DEVICES—Circular illustrates Twist-Lock Wiring Devices for continuous, uninterrupted service in the operation of motor-driven tools and equipment. Contains description of construction features. Built for hard service, resisting rust, protection from shock and fire. Made in 2-wire, 3-wire, and 4-wire to meet every need. Harvey Hubbell, Inc.

128 HEATPROOF AND FLAMEPROOF WIRES, CABLES AND CORDS—The new No. 10-E Catalog contains detailed and useful information on characteristics, tests, specifications and applications. Illustrates a complete line of asbestos insulated wires, cables and cords designed and contructed to resist heat and moisture, oil, grease and corrosive fumes. Rockbestos Products Corp.

129 WIRING DEVICES—68-page catalog describing complete line of wiring devices, including many which are especially adapted for industrial work. Also 4-page pamphlet listing various fittings now available for P&S-Despard wiring devices. Pass & Seymour, Inc.

130 FACTORY WIRING—Wiremold Wiring Systems including the Wiremold Surface Raceway Wiring System, the Wiremold Overfloor Duct System, the Plugmold Continuous Outlet System and Wiremold Fluorescent Lighting Strip, Reflectors and Fittings are fully described in the Wiremold Catalog and bulletins which will be sent to interested factory executives on request. Wiremold Co.

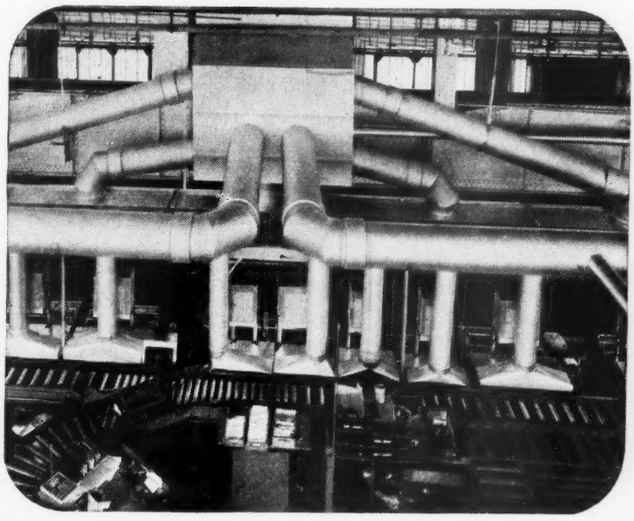
131 WIRING SUPPLIES—Catalog No. 37 lists and describes wiring devices for industrial building and maintenance and for product installation. A complete line of heavy duty lampholders, outlets, switches, cutouts, and fuses especially suitable for industrial service and appliance and equipment intallation. Bryant Electric Company.

132 CORDS AND CABLES—Portable cord and cable users will want a copy of the "Engineering Analysis of Super Service." This 4-page folder contains an interesting sample of jacket compound and plenty of rock-bottom facts. General Cable Corp.

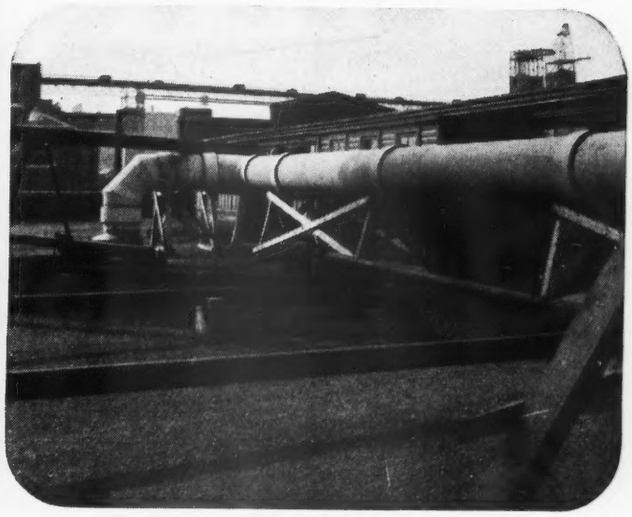
133 WIRES AND CABLES—Bulletin H-106 describes moisture-proof building wires and cables providing economical and dependable wiring for wet locations, underground, in masonry in contact with earth, permanently moist locations and wet conduits. Bulletin H-105 discusses non-inflammable wires and cables. Habirshaw Cable and Wire Div., Phelps Dodge Copper Products Corp.

Pages B143, B144, B146, B148, B150, B152 list descriptions in addition to those in the insert B139-142. Check the postcard on B142 for bulletins you want.

LET J-M TRANSITE "S" PIPE Solve Your Venting Problems...



PROCESS FUMES ARE HANDLED ECONOMICALLY in this Transite "S" Pipe system. Note the wide range of sizes used here. Installation was rapid, because Transite Pipe is supplied in a size for every requirement . . . and fittings are available to solve every construction problem.



FOR FIVE YEARS this J-M Transite "S" Pipe line has withstood CO_2 on the inside, weather on the outside. Made of asbestos and cement, this durable pipe offers exceptional resistance to most types of corrosive fumes and gases . . . keeps maintenance costs low, efficiency high throughout the years.

This asbestos-cement duct has proved to be the ideal material for venting a wide variety of industrial fumes, gases, vapors and dust

PLANNING a new ventilating system? Replacing or extending your existing ducts? You'll be interested in this modern vent pipe that is setting new records for long life and efficient, economical service in many leading plants throughout the country.

This material—J-M Transite "S" Pipe—is made of asbestos and cement. Built up under tremendous pressure on a polished steel mandrel, it is uniformly strong, durable and highly resistant to most corrosive fumes and gases commonly vented at high temperatures.

Furthermore, Transite's long, light lengths, ease of assembly and the complete line of fittings available make installation a faster, easier, more economical job . . . even in restricted working quarters. Yet, with all these advantages, the cost of Transite "S" Pipe is surprisingly low. For full details, write for Engineering Brochure DS-336. Address Johns-Manville, 22 East 40th Street, New York, N. Y.

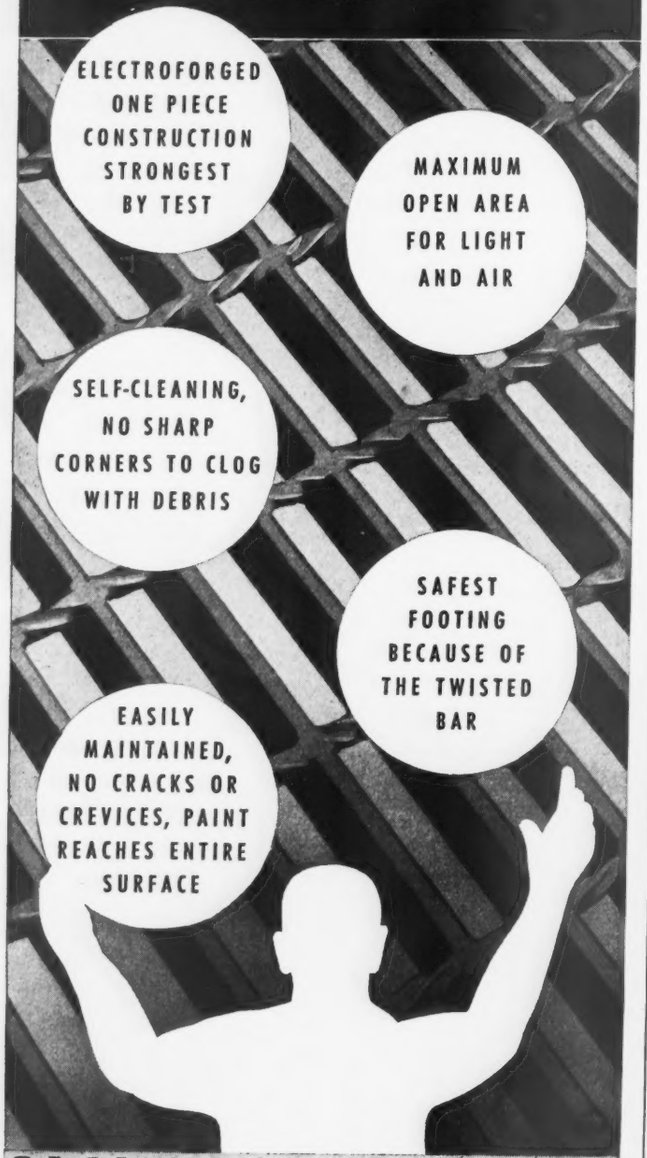
OUTDOORS, the asbestos-cement composition of J-M Transite "S" Pipe also provides important advantages. It is highly weather-resistant . . . and its low heat conductivity keeps stack temperatures high for long distances. Draft is greatly improved, condensation is minimized.

Johns-Manville TRANSITE "S" PIPE

For permanent, low-cost industrial venting systems

SEND FOR A SAMPLE OF BLAW-KNOX *Electroforged* STEEL GRATING

Check these 5 points of superiority
Use the coupon below


ELECTROFORGED ONE PIECE CONSTRUCTION STRONGEST BY TEST
MAXIMUM OPEN AREA FOR LIGHT AND AIR
SELF-CLEANING, NO SHARP CORNERS TO CLOG WITH DEBRIS
SAFEST FOOTING BECAUSE OF THE TWISTED BAR
EASILY MAINTAINED, NO CRACKS OR CREVICES, PAINT REACHES ENTIRE SURFACE

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
FARMERS BANK BUILDING PITTSBURGH, PA.

SEND GRATING SAMPLE TO

NAME _____

COMPANY _____

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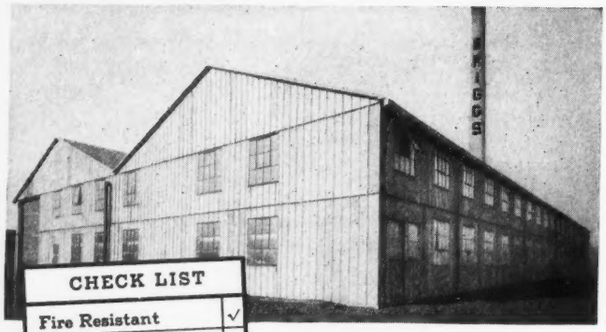
CITY _____ STATE _____

SAVE MONEY WITH MESKER STEEL BUILDINGS



CHECK LIST	
Fire Resistant	✓
Low First Cost	✓
Immediate Shipment	✓
Easy to Erect	✓
Attractive	✓
Low Maintenance	✓
Low Insurance	✓
Long Life	✓
Easily Altered	✓
Readily Movable	✓

Do you need a new plant or warehouse? Or an addition to your present building? It'll pay you to investigate Mesker Steel Buildings! Made to your measure—from *standardized* units—at mass-production savings. Send dimensions and rough sketch of your needs for our engineers' free recommendations. Or write today for an illustrated catalog showing typical low-cost Mesker Steel Buildings.

GEORGE L. MESKER & CO. **Evansville, Indiana**

Victoria
TOILET TISSUES
BLACK CORE
Made by VICTORIA PAPER MILLS COMPANY FULTON, N.Y.
Craftsmen in the art of paper making for 58 years. Distributed by reliable paper merchants everywhere.
Made Right Priced Right

(Advertisement)

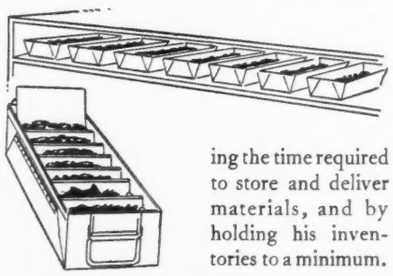
There's No "Free Air" In Your Factory

Whether you own or rent your plant, the space required to store tools and materials costs you money. Every cubic foot saved cuts plant cost and increases earning possibilities.

By H. B. SPACKMAN

V. P. in Charge of Sales, Lyon Metal Products, Incorporated

Few of us are conscious of our faults, because we have been living with them for a long time. For the same reason, perhaps, it is hard for a factory executive to recognize the losses inherent in obsolete storage equipment . . . to visualize the extra profits he might earn by releasing wasted storage space for other purposes, by reducing the time required to store and deliver materials, and by holding his inventories to a minimum.



Two Simple Tests of Storage Efficiency

Wasteful methods of storing small parts generally follow one of two methods. The parts may be stored in tin bread pans or similiar makeshift metal containers. Or, they may be held in wood bins or boxes.

These inflexible containers are usually all the same size, regardless of the size and number of parts to be stored in them. As a result, for every bin or container that is loaded to capacity even during peak production, there are a dozen or more that are only partially filled.

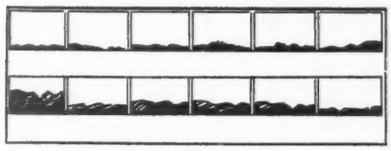
Space Savings of 50% by No Means Uncommon

A manufacturer of printing machinery discarded the bread pan storage system in favor of modern steel storage units and found that one of his new seven-compartment Lyon Shop Boxes—designed specifically for economical handling — did the job of seven wasteful-shaped bread pans, with better than a 50% reduction in the space required for his small parts storage. The accompanying diagram indicates why such a substantial savings was possible.

Wood shelving, the old method of storing both large and small materials and parts, results in equal or greater space losses than makeshift metal containers. This is due largely to the inflexibility of such shelving.

When a carpenter is called in to construct a series of wood bins, he generally builds each row of shelf openings the same height and width. And that size must necessarily be ample to hold the largest amount of the materials most frequently required in production.

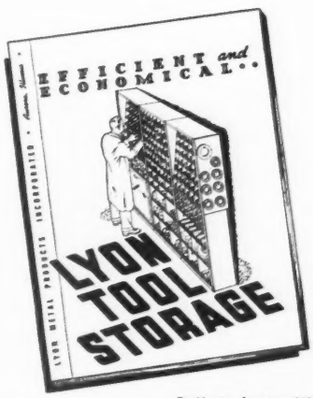
As a result, the bins, when in use, have the appearance indicated by Diagram B. In other words, a few of the bins are fully loaded . . . using the maximum available capacity. But the neighboring bins, used for materials that require only half the space provided even during peak production, represent a tremendous waste of storage area.



Check the "Air" in YOUR Storage System

Take a look at your storage facilities with a fresh viewpoint and a critical eye for half-empty bins . . . for odd-shaped containers. Then estimate how much storage space you are paying for each month . . . and how much of your storage cost is for space that never returns a penny in income.

Or, if you want a complete and accurate check up of all wasteful features that may be eating into profits, call in a Lyon Engineer. He will give you a complete and accurate estimate on whether, where and how space, time and inventory savings may be made by the installation of modern storage equipment.



HERE'S YOUR KEY To New Tool Storage Efficiency

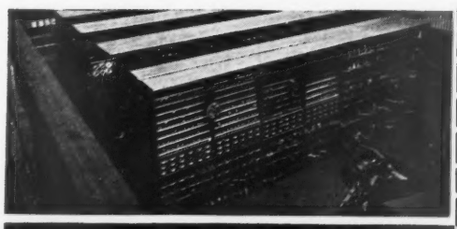
. . . Shows the most complete line of Toolroom Equipment ever built.

● No matter how complex or unusual your tool storage problem, it can be satisfactorily solved with some economical combination of the Lyon adjustable steel equipment shown in this new, complete catalog.

Built to last a lifetime, Lyon Steel Tool Storage Equipment prevents misplacing and damaging tools through improper storage . . . protects against fire and pilferage . . . saves labor and floor space. Shelves and dividers are completely flexible . . . can be taken down quickly and rearranged to meet new tool storage needs and space requirements.

This new book merits your immediate attention . . . may help you effect major toolroom savings. Ask for FREE copy today on coupon below, or your business letterhead.

LYON METAL PRODUCTS, INCORPORATED, AURORA, ILL.



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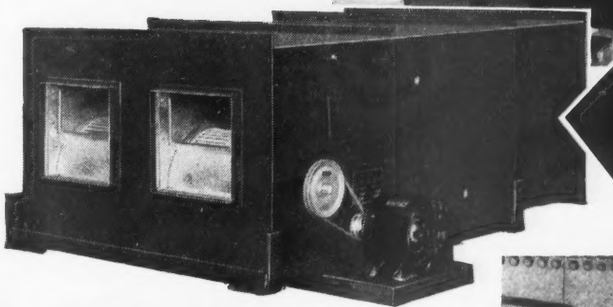
Summer Cooling *at* LOW COST!

Read How These Complete Units Save Time and Money

CLARAGE MULTITHERMS

Today almost every business can afford to take advantage of summer cooling. These conditioning units have helped to make that possible. They operate just as satisfactorily as the larger, expensive central systems (controlling both temperature and humidity) . . . and you can make the complete installation in a few days' time at surprisingly low cost.



COMPACT! *Almost any small idle space can be used for a Multitherm installation—suspend them from the ceiling or wall, or locate them on the floor. Operating (power) costs are low, and units give a lifetime of dependable service.*

NO COSTLY CHANGES! Multitherms are ideal for use in present office buildings, in factory depts., etc.—drastic building alterations NOT necessary.

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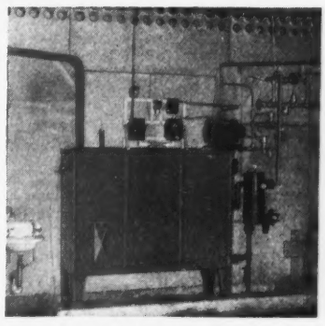
OVER 25 YEARS' EXPERIENCE manufacturing the finest of air-handling equipment are back of Clarage Multitherms. Write for Bulletin 107 which gives complete details.



Use Clarage Unitherm Coolers for product cooling — save in both first and installation costs. Ask for Bulletin 77.

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INTO YOUR FACTORIES *New and Old*

Maintenance costs in any plant are affected directly by the kind of paint used to protect the structure and its equipment. For lowest cost of complete paint protection per square-foot-year, choose Dixon's Industrial Silica Graphite Paints.

The superiority of these paints is due to the mechanical, physical, and chemical properties of the component materials. The pigment, natural silica-graphite, is chemically inert and inherently water-repellent. In boiled linseed oil, it forms a coating of flat microscopic particles, overlapping shingle-like to plate the surface with an armor that clings with utmost tenacity. Unmatched resistance to time, the elements, and inimical fumes is what makes Dixon's Industrial Silica Graphite Paints the logical choice for every industrial painting job.

Fourteen colors, including two Aluminum shades. Color Card and Master Specifications B144 mailed on request. Inquire also about Dixon Paint maintenance surveys and reports—bases for a scientific program suited to the specific requirements of your plant.

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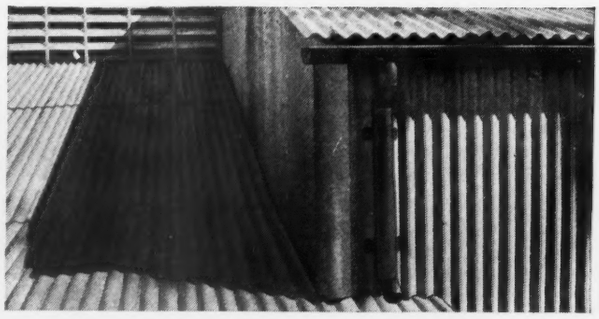
Established 1827 — Jersey City N. J.

DIXON'S INDUSTRIAL SILICA-GRAPHITE PAINT



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Corrugated Asbestos-Cement Sheets

An economical, attractive, fire-proof, corrosion-resisting roofing and siding material that is not affected by humidity, salt air, tropical sun, heavy rains, rapid changes of temperature, steam, frost or chimney gases.

Easy to apply on skeleton steel or wood framework. Made in sheets 3 to 12 feet long in 6 inch multiples, 42 inches wide. Write for full data. DEPT. F 4-39

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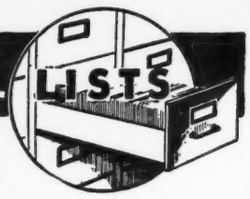

As publishers of Radio Retailing for twelve years, McGraw-Hill is uniquely equipped to offer complete, authoritative Direct Mail coverage of the Radio Trade. Extreme accuracy (guaranteed 98%) is maintained on a daily corrected basis and the widest possible selections are available. Send for folder entitled "Hundreds of Thousands of Reasons Why" which describes how McGraw-Hill lists are built and maintained.

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Seventy-foot candles on the working plane with the Type H MAZDA Mercury Lamps hung at a 14-ft. level.

. . . with TYPE H MAZDA MERCURY LAMPS

Better light for better sight and better, more uniform production with a minimum of fatigue. That is the modern picture of industrial trends. Men responsible for production are more and more concerned with the levels of illumination. They realize that lighting directly affects the efficiency of all men and machines. » » »

Jobs like the one shown are typical of what is being done. Bear in mind with Type H MAZDA Mercury Lamps you can provide higher light output for a given cost of energy. Enlist the cooperation of the General Electric Engineers. Have them assist you in providing light "engineered to fit the job."

Order your auxiliary devices which were designed especially for this lamp from the General Electric Vapor Lamp Company.

GENERAL ELECTRIC

939H

General Electric Vapor Lamp Co.
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FAN *interest into* BUYING ACTION

You can fan interest into orders with Performance Photos that show your product in actual operation. They will add power to all your advertising and selling efforts, and will help boost your sales skyward. Costing little . . . they greatly reduce selling cost. Send for illustrated booklet.

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Demon Rust destroys

RUST eats its way into the profits of industry to the tune of a billion dollars yearly! And you're probably footing a sizeable share of this bill right now. For as long as water and oxygen can reach any part of your plant's metal surfaces, costly corrosion is inevitable. That's why it's important for you to investigate Pittsburgh's scientifically compounded metal protective coatings. Water and oxygen are present in all locations and destructive fumes circulate in concentrated manufacturing centers. Pittsburgh Metal Protective Coatings resist these destructive influences. And *you* have a better, more prosperous looking plant in the bargain! Pittsburgh Plate Glass Co., Paint Division, Pittsburgh, Pa.

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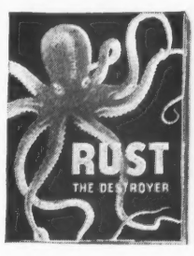
Smooth as Glass

COMPLETE LINE OF STRUCTURAL MAINTENANCE FINISHES

SEND FOR THIS VALUABLE BOOK FREE!



Get the complete facts about rust — facts that may save you real money. You'll find everything you want to know about this important subject between the covers of "Rust The Destroyer". Just fill out the coupon below for your free copy.

Pittsburgh Plate Glass Co.,
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MAINTENANCE COSTS STAY DOWN WITH...

J-M CORRUGATED TRANSITE ROOFING AND SIDING

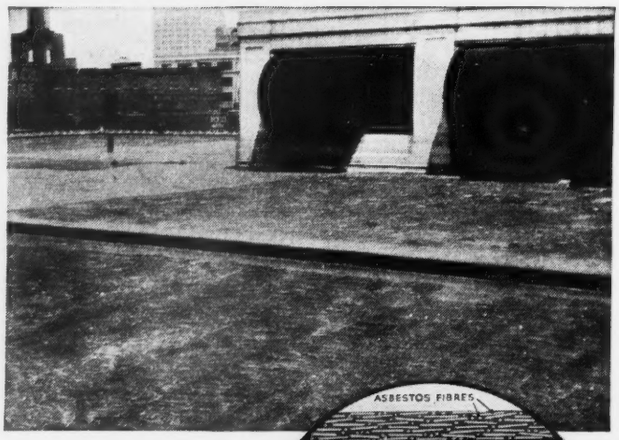
LOW MAINTENANCE COSTS assured with J-M Corrugated Transite. This asbestos-cement material provides unusually high resistance to weather and corrosion . . . cannot rot or decay . . . never needs painting. Erection is simple and economical, for the strong, rigid sheets are easy to handle . . . go up rapidly on any skeleton framework.

EVEN under severe service conditions, J-M Corrugated Transite provides maximum assurance of long life and low maintenance. Made of asbestos and cement molded into a tough, rigid sheet under tremendous pressure, this durable material cannot burn, rust or rot . . . offers exceptional resistance to weather, corrosive fumes and gases.

But long life is only one advantage of J-M Corrugated Transite. Large, relatively lightweight sheets are easy to handle and apply . . . provide good-sized savings at installation. You should have complete information on this unusual material and its many industrial uses. Send for Corrugated Transite Brochure TR-12A. Write Johns-Manville, 22 East 40th Street, New York, N. Y.

J-M CORRUGATED TRANSITE ROOFING AND SIDING

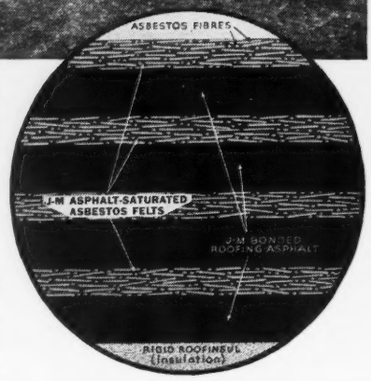
J-M BUILT-UP ASBESTOS ROOFS



THIS 25-YEAR-OLD J-M ROOF at Kansas City, Mo., still looks good for many years of economical service.

•

REASONS WHY J-M Roofs last longer with less upkeep are shown at right. The asbestos fibres, being non-capillary, prevent the waterproofing oils in the asphalt from being drawn off by the sun. Each ply of asbestos felt acts as a protective stone blanket to the underlying layers of asphalt.



TODAY, many 25-year-old J-M Roofs are still giving unusually efficient service . . . seem good for many years to come. Largely responsible is the fact that these roofs are built up with asbestos felts. Combined with J-M Bonded Asphalt, this permanent mineral makes a fireproof roof that gives maximum protection against the drying-out action of the sun.

You'll be interested in the complete discussion of built-up roofing problems in the new J-M Brochure BU-30A. For your free copy, write Johns-Manville, 22 East 40th Street, New York, N.Y.

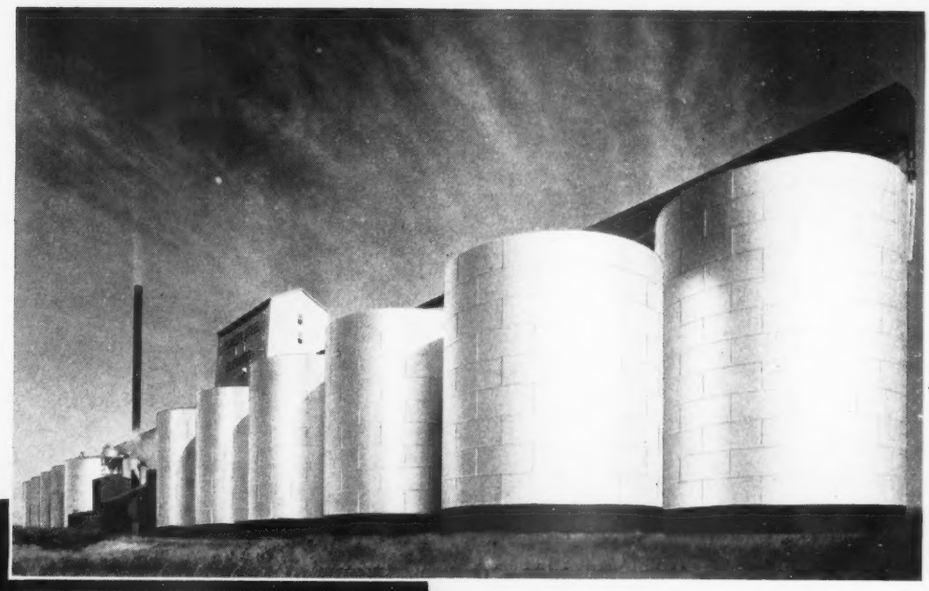
J-M BUILT-UP ASBESTOS ROOFS

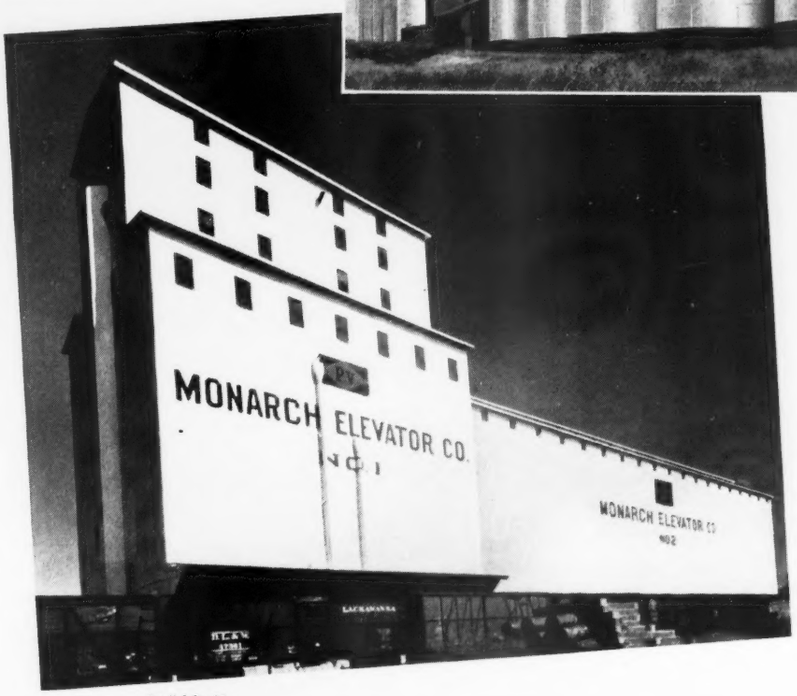
GRAIN ELEVATORS SPRUCE UP *with Aluminum Paint*

Once just a row of black hulks against the sky, these elevators became a beautiful silvery sight when the Pioneer Steel Elevator Company, Minneapolis, spruced them up with Aluminum Paint.

★

Improved appearance was just one of the reasons why the Monarch Grain Elevator Company, Minneapolis, used Aluminum Paint. Maximum protection of wood and corrugated steel siding was another consideration.





You Get More Paint-Years per Dollar with Aluminum Paint

During the last 15 years the extra durability of Aluminum Paint has been demonstrated on industrial structures of every kind. Over a rust-inhibitive priming coat, it excels in protecting steel. On wood, Aluminum *House* Paint is a most effective barrier to moisture and sunlight. Aluminum Paint resists corrosive action and discoloration by smoke and fume. For longer life, standardize on Aluminum Paint.

GET THIS BOOK!

Gives complete technical data about the types of Aluminum Paint to use for different services. Write ALUMINUM COMPANY OF AMERICA*, 2126 Gulf Building, Pittsburgh, Penna.

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ALCOA ALUMINUM
ALBRON *Paste for*

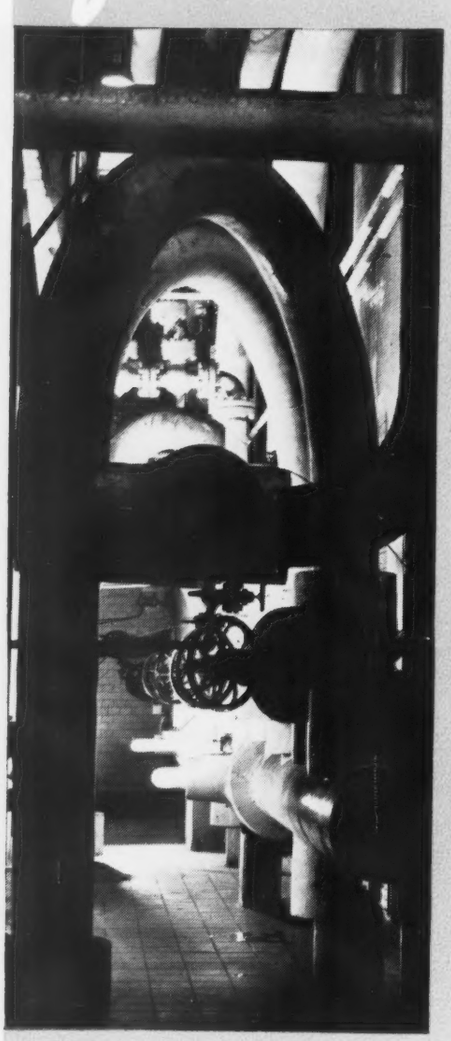
**We make no Aluminum Paint; only Alcoa Albron Paste and Powder, the pure Aluminum pigments you get in leading brands of Aluminum Paint.*

ALUMINUM PAINT

INDUSTRIAL RAYON CORPORATION NEEDS

Power and Water Enough for a City of 450,000

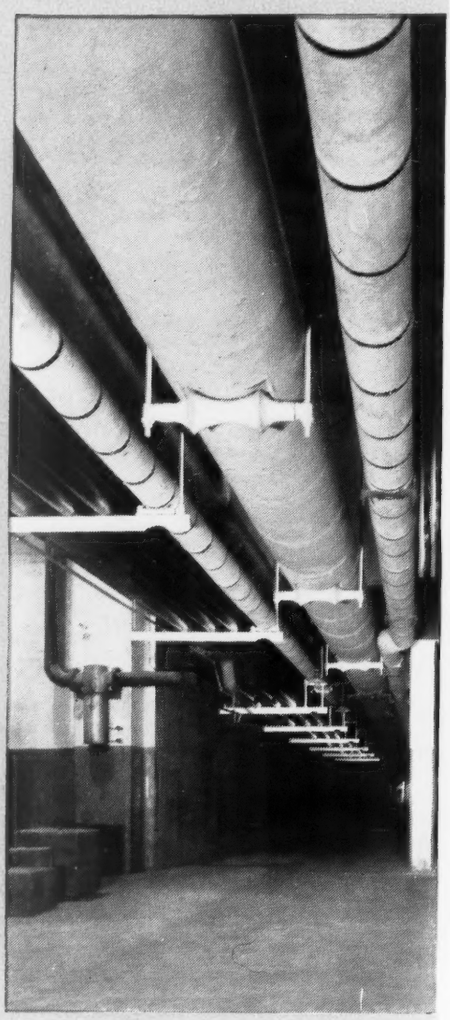
IT'S DELIVERED BY GRINNELL!



Engineers who planned this huge project turned to Grinnell for construction of the plant's vital high-pressure steam line, and supply of the water and air conductors.

(LEFT)
Grinnell's exclusive hydraulic extruding machines permitted the construction of a steam header whose outlets are smooth and strong, joined by plain circumferential butt welds to the high pressure piping. This assembly handles 725 pounds of steam at 780°F.

(RIGHT)
Grinnell Pipe Hangers were chosen for quick, easy installation. With these hangers, adjustments to correct weight distribution are easily made *after erection.*



For accurate sub-assemblies, easily field-welded . . . "Give the plans to Grinnell." Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Branch offices in principal cities.

PREFABRICATION BY **GRINNELL**
WHENEVER **PIPING** IS INVOLVED

AN INCREASING DEMAND

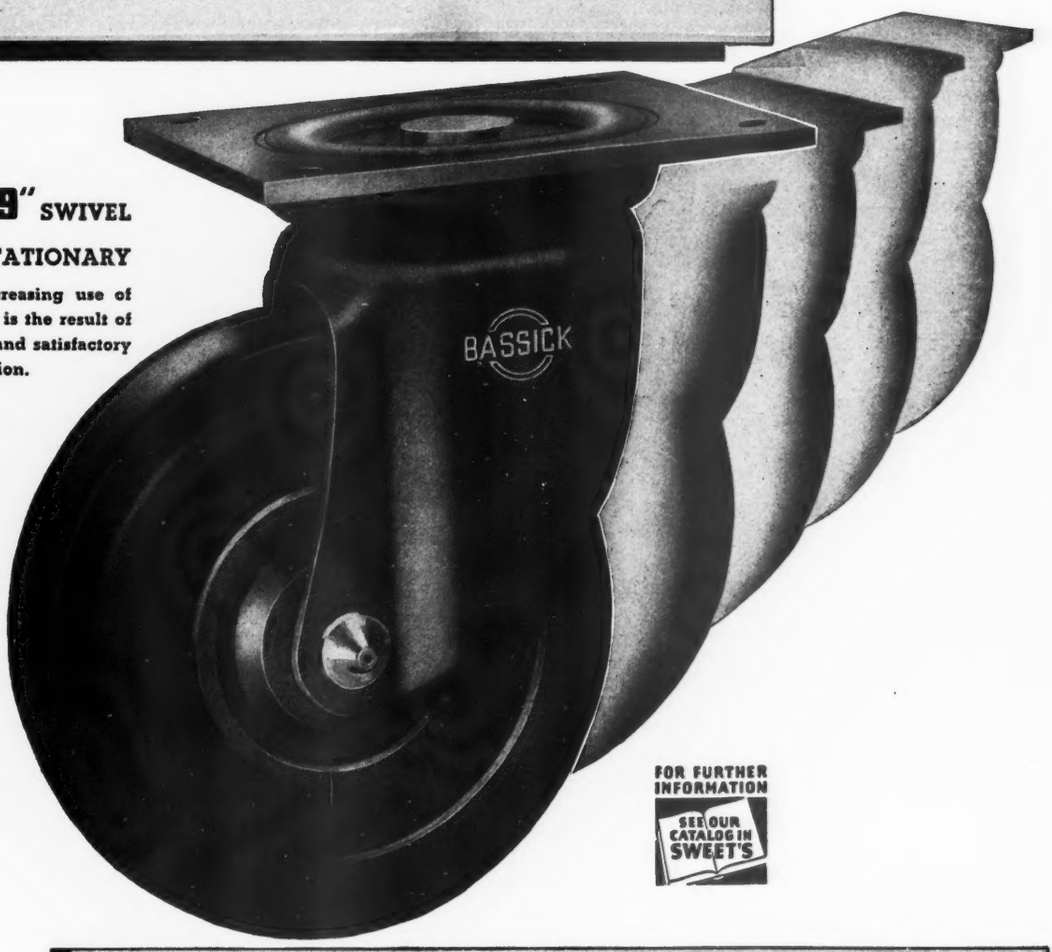
for Bassick

SILENT STEEL SPECIAL DUTY

TRUCK CASTERS

SERIES "99" SWIVEL
"98" STATIONARY

The steadily increasing use of these new casters is the result of unusual quality and satisfactory service in operation.



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● For use wherever real ease of operation, quietness and dependability are desired. These double ball race, precision made, projection welded casters carry their loads economically. Furnished with 3", 4", 5", 6" and 8" wheels, swivel and stationary to match. • This is only one type in the Bassick line of over 500 truck casters . . . a *complete* line that includes the correct size and type for every requirement. Sold by leading industrial distributors conveniently located to give you service. Write for catalog No. 120.

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Canadian Factory: STEWART-WARNER-ALEMITE CORPORATION OF CANADA, LTD., BELLEVILLE, ONTARIO

You Want to Know

more about the items mentioned on this page.
Letters to the addresses given will bring information

• ANYONE can operate a suitcase-size printer that will duplicate drawings, charts, reports, and letters in five minutes. Positive contact prints up to 12x18 in. are made on special sensitized paper. Electronic Products Mfg. Corp., 208 West Washington St., Ann Arbor, Mich.

• LUBRICATION PROBLEMS hanging heavy over the maintenance man's head may be on their way to solution if said m. m. gets his name on mailing list of a new house organ "Helpful Hints," which aims to air such problems and their solutions. E. F. Houghton & Co., 240 West Somerset St., Philadelphia.

"HANDY HELPER" shown here in service-station use will never find a bigger welcome than it will in industrial plants, nor be put to better use—by maintenance and set-up men. It brings localized light to the workplace, and tools as well, has a foot brake that prevents its shifting while in use. Revere Electric Co., 757 West Jackson Blvd., Chicago

• PENCIL will do nicely on a new type of tracing cloth. Blueprints made from it have sharp lines—not the fuzzy lines characteristic of prints made from pencil drawings. Frederick Post Co., P. O. Box 803, Chicago.

• SOUVENIR BOOKLET to be given to more than 15,000 visitors expected to come this year to the Caterpillar Tractor Company's plant at Peoria, Ill., is good example of the type of facts that might be presented to your visitors to help them remember highlights of their visit.

• CORRECT SIZE of tap drills for U. S. standard screw threads can be read in a jiffy from the "Handy Time Saver Disk," which also has a chart of decimal equivalents. Dayton Rogers Mfg. Co., Minneapolis.

• JOINT FILLER, rubber expansion type, for concrete floors, driveways, and sidewalks is adaptation of filler used in highway construction. So it must be able to take it. It will compress as the concrete expands, and recover when it contracts. Mechanical Rubber Goods Division, The B. F. Goodrich Co., Akron.

• RUBBER DRESSING restores original luster to black rubber products. E. H. Stackhouse, 219 North 63rd St., Philadelphia.

• ADJUSTABLE SOCKET adapts new sizes of lamps to existing equipment, has four vertical positions so that changed light centers can be properly located in existing reflector equipment. Goodrich Electric Co., 2900 North Oakley Ave., Chicago.

• NON-SKID PAINT takes slipperiness out of steel floor safety plates, concrete floors, stair treads. It's made by mixing 8 lb. of stainless steel flakes with 1 gal. of a varnish vehicle. United Laboratories, Inc., Cleveland.

• PLANTS where lunchrooms are not feasible will probably be interested in calling employees' attention to electrically heated lunch boxes which, plugged into an outlet, will heat up a complete noonday meal in 15 minutes. Omer S. Smith Co., Rockford, Ill.

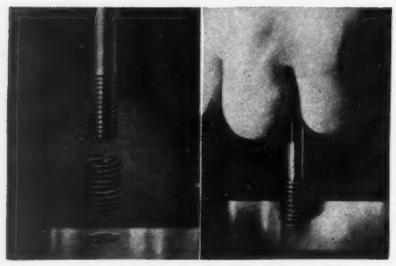
• MARKER, hand-operated, will roll a mark into metal or plastic ferrules, rings, and tubes up to 1½ in. in diameter. Marks up to 1¼ in. by ½ in. top to bottom can be made as fast as 30 per min., it is said. H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.

• SOMETHING NEW in identification tags is made of three parts crimped together in a press, so that the tag can't be altered without destroying it. It's easily read, too, and has space for name, address, age, weight, height, social security number, department, and issue date. George D. Ellis & Sons, Inc., 309 North Third St., Philadelphia.

• PAPER made from purified cellulose by a special process is exceptionally strong when wet. Brown Co., 420 Lexington Ave., New York; Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.; Paterson Parchment Paper Co., Bristol, Pa.

• LIGHTING INFORMATION digested from publications all over the world comes in a bulletin issued in England ten times a year. General Lighting Information Service, 25 Victoria St., Westminster, London, S. W. 1.

• PROTRACTOR for mechanics, layout men, and toolmakers is graduated for the full circle, is accurate to 5 min. or 1/12 of a degree. May be had with 6, 8, or 12 in. blades which are beveled at each end to 45 and 60 deg. respectively. George Scherr Co., 128 Lafayette St., New York.



THREADS tapped in light alloys, such as those of aluminum and magnesium, wear quickly and break because the metal is so soft. This problem has led to the development of the "Aero-Thread Screw Thread System" in which a spirally wound precision insert or bushing, formed from high-tensile, bronze spring wire, is screwed into the tapped hole and forms the seat for studs and capscrews. Insert remains in the hole to protect the soft threads when studs are withdrawn and replaced. Air Associates, Inc., Garden City, N. Y.

• DESK ORGANIZER is name of handy horizontal cabinet that rests on the desk, holds those miscellaneous papers, classified, until you've finished with them and they're ready for the files. Charles G. Cooper, 551 Fifth Ave., New York.

• AS MANY AS SIX voice-powered phones may now be used on the same circuit. These require no power source other than the speaker's voice. Graybar Electric Co., Graybar Bldg., New York.

• PAINT for concrete floors has binder of synthetic (alkyd) resin and casein that is said to give it tenacious bonding power. Comes in paste form and thins with water. National Chemical & Mfg. Co., 3617 South May St., Chicago.

How to do it?

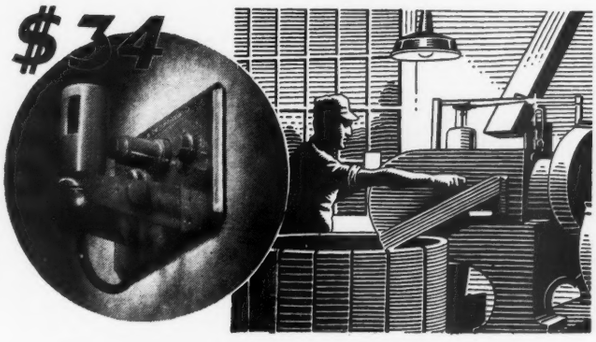
Every one of these electric devices may quickly pay for itself in your plant

IMPROVE YOUR POWER-FACTOR

If your power contract includes a power-factor adjustment or kva-demand clause, you may be able to make substantial savings by installing G-E power-factor-improvement equipment. Hundreds of industrials have installed G-E Pyranol capacitors for this purpose. Ask us for Publication GEA-2742.

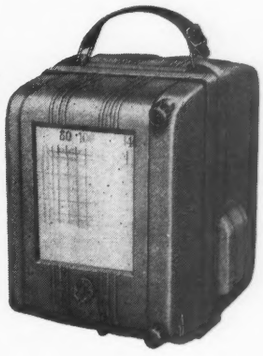
INCREASE CIRCUIT CAPACITY QUICKLY AND INEXPENSIVELY

With these new air-cooled transformers, power voltages can be stepped down, for lighting or low-voltage power loads—at any point in your plant. They offer many advantages, such as reduced losses better voltage, etc. Let us send you our new Publication GEA-897H.



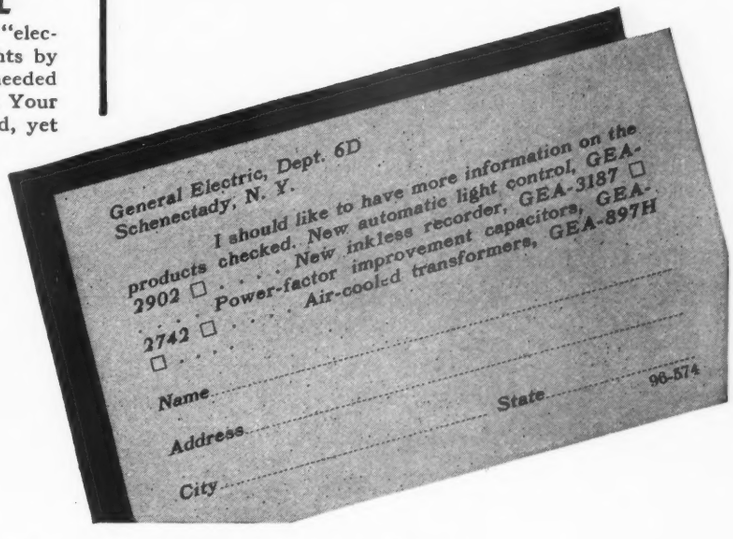
USE YOUR LIGHTS EFFICIENTLY WITH G-E AUTOMATIC LIGHT CONTROL

G-E automatic light control (which makes use of the "electric eye") provides efficient use of your electric lights by automatically turning them on only when they are needed—and by turning them off when they are not needed. Your workers will have light to work by when it is needed, yet unnecessary use of lights will be eliminated. Price, complete with 30-amp contactor, $34. For further information, ask for GEA-2902.



NEW RECORDING INSTRUMENT SIMPLIFIES SURVEY WORK

You've never seen a recording instrument quite like this. It weighs only 11 pounds. Uses no liquid ink; therefore there's nothing to freeze or spill and thus spoil the record. Use it indoors or out. The most recent addition to General Electric's complete line of electric instruments. Send coupon for Bulletin GEA-3187.


General Electric, Dept. 6D
Schenectady, N. Y.
I should like to have more information on the products checked. New automatic light control, GEA-2902 ☐ . . . . New inkless recorder, GEA-3187 ☐
Power-factor improvement capacitors, GEA-2742 ☐ . . . . Air-cooled transformers, GEA-897H ☐ . . . .
Name
Address
City
State
96-574

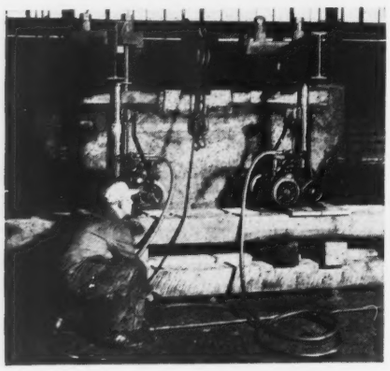
GENERAL ELECTRIC

SEE THE G-E "HOUSE OF MAGIC" AT BOTH FAIRS

What's New in Equipment

Jack

Air-operated power jack incorporates a high-speed rotary motor, has finger-tip throttle control. Valve in air lines permits



operation in pairs, providing even raising or lowering of the load. Automatic shut-off eliminates possibility of running the lifting standard out of its shell. To facilitate movement over rough shop floors, rubber-tired wheels are built as an integral part of the jack. Available capacities: 25-100 tons with raises 14-30 in. Duff-Norton Mfg. Co., 2709 Preble Ave., Pittsburgh.

Air Scrubber

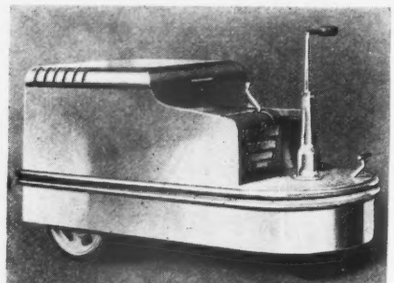
"Triple Action Scrubber," for removal of fog, dust, and other particles from gas and air, separates the impurities by a 3-step process. Gas enters tangentially near the base of the scrubber and is there relieved of coarse particles by cyclonic action; passes upward through a zone of water where the dust particles mingle with water droplets; goes through a coarsely perforated plate where velocity is increased. Mixture of gas, dust, and droplets is shot at square impingement baffles where dust particles and water droplets merge with water around the baffle, and are permanently captured in the scrubbing liquid. Liquid overflow pipe carries off the dust-laden water. Gas or air continues upward. Eliminator vanes below the outlet trap any remaining droplets, thus leaving dry, cleaned gas. Peabody Engineering Corp., 580 Fifth Ave., New York.

Gages

Cylindrical plug gages check small holes. The plugs are made of high carbon tool steel, are hardened, ground, precision lapped. Held in a steel holder by a collet, they may be removed, reversed, or replaced. Handles are marked with gage diameter. Available in diameters from 0.010-0.084 in. in every 0.001 in. May be obtained on special order every 0.0005, 0.00025, or 0.0001 in. from 0.004-0.150 in. Double-end gages to check tolerances are also available. Grobet File Corp. of America, Three Park Place, New York.

Tractor

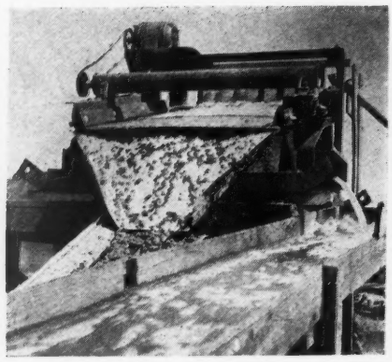
Narrow tread electric tractor with 32-in. over-all width has rated normal drawbar pull of 500 lb., and maximum of 1,000 lb. The frame is channel iron. Covered with steel plates, it is welded into an integral unit. A heavy rubber bumper extends around the machine. Drive tires, 20x3½ in., are attached to a drive axle of the worm reduction type with transverse semi-elliptic spring suspension. Steering is single wheel—15x3½ in., rubber tired. Drum-type controller provides three travel speeds forward and three reverse.



Available in enamel finish, or with stainless steel body and chrome-plated exposed running gear. The Mercury Mfg. Co., Inc., 4044 South Halsted St., Chicago.

Combustion Safeguard

"Photo-Head," an adjunct to the "Flame-otrol" safeguard, is designed for fuels other than gas, burning with luminous flames. Constructed with a photoelectric cell and using the "Flame-otrol," it takes the place of the standard electrode, affords protection against flame failure, and provides automatic ignition of oil burners, thus making the application of automatic "on-off" control possible with intermittent or constant pilots. Sensitive to characteristics of luminous flame, it is not responsive to heat radiation from a combustion chamber. It prevents the entry of unburned fuel into the combustion unit by shutting down the fuel supply. Where combustion equipment uses combination fuels, "Photo-Head" is used in conjunction with the standard electrode. Wheelco Instruments Co., 1929-33 South Halsted St., Chicago.



Vibrating Screens

Replaceable vibrating screen for removal of solids from factory waste water has a screening surface of fine-mesh stainless steel screen cloth that measures 2x4 ft. or 4x5 ft. A self-contained unit, it is furnished with a steel collecting tank under the screen cloth. Mounted on top of the steel framework is a 1- or 2-hp. motor (depending on the size of the screen). No spray water is required as the mechanical vibratory action of the screen removes the particles. Link-Belt Co., 307 North Michigan Ave., Chicago.

Regulator

Type V080A Combustion Regulator is designed to hold steam pressure in a gas-fired boiler within close limits, and to control the air supply to the burner. The control is mounted on the gas valve bonnet at a single point. It can be installed for automatic firing of radiant or blue flame burners of the atmospheric type. The terminal panel is arranged for incorporation of safety devices such as a low water cutoff, a flame safeguard relay. Interruption of the electrical safety circuit by the safety devices will cause a shut-down of the gas valve regardless of the demand on the regulator due to low steam pressure. Minneapolis-Honeywell Regulator Co., Minneapolis.

Hoist

"Power Master" controlled, gravity-lowering chain hoist controls lowering speed by clutch and governors—thus eliminating hand-over-hand operation of chain. It has free chain for quick up-or-down load chain adjustment, and is equipped with lubri-

HOW TO GET MORE GALLONS AT LESS COST!

Here's a Tip on How to Cut Your Pumping Costs! And It's Based on Facts ... Facts You Should Know About Extra Value SSUnit Pumps!

There's more than one way to save money . . . but there's no quicker way than to replace those old, worn out pumps in your plant with modern Allis-Chalmers SSUnit Pumps!

For great engineering — the same great engineering that designed and built the gigantic Boulder Dam and Niagara Falls turbines — originated the low-cost, motor coupled pump in 1926 to give industry greater pumping economy.

And that pump—the fast-selling SSUnit—is setting new low-cost pumping records . . . actually giving plants all over the country more water per dollar of power cost!

There's new flexibility of operation in SSUnit's compact, husky design that cuts maintenance costs . . . beats space waste . . . lets you put the unit in any position you want it!

Bronze construction of the enclosed runner, wearing rings and shaft sleeves means complete protection against rust or excessive wear. And every unit is completely tested before delivery . . . your guarantee that it can go to work for you the minute it is installed.

Get Undivided Responsibility!

Remember, too, that coupled to the pump is the famous Allis-Chalmers Lo-Maintenance Motor . . . the motor that has proven performance records of beating conditions that many times wreck ordinary motors in a few weeks. There's no "buck-passing" . . . Allis-Chalmers accepts full responsibility for both the motor and the pump!

These are plus features that work for you . . . give you a pump that cuts dollars from your operating costs! Call the nearest district office, or write direct to Allis-Chalmers, Milwaukee. Get started today on real pump savings!

1072

MAINTAINING PROPERLY HUMIDIFIED air for the air-conditioning system of a large mid-western malting plant, this Allis-Chalmers SSUnit pump and Lo-Maintenance Motor cut service costs to a minimum.

CENTRIFUGAL PUMP DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

SINGLE-STAGE DOUBLE-SUCTION PUMPS • CLOSE-COUPLED SINGLE-STAGE SSUnit PUMPS • MULTI-STAGE PUMPS • PAPER STOCK PUMPS • MIXED FLOW AND AXIAL FLOW PUMPS • AND SPECIAL DESIGNS FOR UNUSUAL APPLICATIONS

sealed ball bearings with planetary gear system sealed and running in oil. Capacities 1-8 tons with unit weights as low as 86 lb. for the 1-ton, and 169 lb. for the 8-ton model. Coffing Hoist Co., Danville, Ill.

Fire Extinguisher Cabinet

Fire extinguisher cabinet accommodates a standard 2½-gallon, soda, acid or foam extinguisher. A red or yellow low-wattage lamp on top makes extinguisher location

visible from a distance of several hundred feet. Equipped with a heating unit located under the base, it is protected against sub-zero temperatures. A hammer for breaking glass to open door is provided and, for quick servicing, the extinguisher is equipped with an unlocking device. Available in single or double cabinets. The Lintern Corp., 7960 Lorain Ave., Cleveland.

Motors

Explosion-proof motors for operation in locations where inflammable liquids or gases are manufactured, handled or stored are totally inclosed and have fan-cooled frames. Will withstand explosions inside the motor, and prevent flames produced by such an explosion from reaching the surrounding atmosphere. Heat capacity is great enough to prevent the motors from reaching a temperature high enough to ignite surrounding gases. Available in sizes ¾ to 40 hp. Howell Electric Motors Co., Dept. K, Howell, Mich.

Stacking Boxes

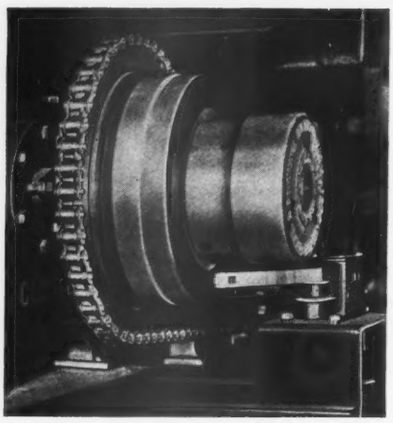
Steel stacking box has a rim on all four sides that is an integral part of the box, being made by a series of bends in the steel itself. The rim adds strength, prevents unstacking by vibration, and telescoping. Corners are reinforced by steel bands. The box is equipped with either rigid or drop handle, and can be made in any size. Open end stacking boxes are also available. A label holder is provided for identification of contents. Pollard Bros. Mfg. Co., 5502 Northwest Highway, Chicago.

Circuit Breakers

Type ET-20 general-purpose air circuit breakers have a rated interrupting capacity of 20,000 amp., and are intended, primarily, for use as mains in panelboards and for circuit protection of main distribution feeders in switchboards. The poles open and close simultaneously, each being equipped with an inverse time thermal overload and an instantaneous magnetic trip, both operating on a common trip so that an overload on any pole opens the breaker. The trip units are inclosed, interchangeable, and calibrated at 6 to 8 times the rating of the breaker. The breakers are trip free of the handle in any position. The unit is convertible to front or rear connection. I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia.

Overload Safety Cutout

Developed to give overload protection to power drives, cutout operates by opening and throwing a switch that stops the motor; cutout then automatically returns to its original position. Should the drive be started before the overload is removed, the cutout will throw the switch again. For use with pulley, silent-chain sprocket, roller-chain sprocket, V-belt sheave or gear. It is constructed as a flexible self-aligning coupling, has shock-absorbing features, is not affected by direction of rotation, operates vertically as well as horizontally. Available in 750, 1,500 and 3,000 in.-lb.



maximum working torques, it can be adjusted for other torque requirements. Anchor Steel and Conveyor Co., 2563 Bellevue Ave., Detroit.

Connector

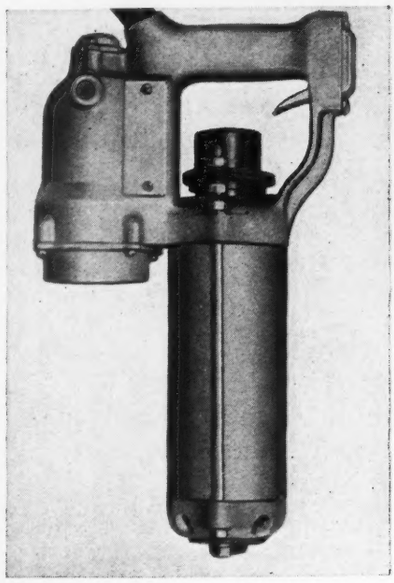
"Loxbox" connector No. 7215-V for armored cable requires no locknut. By turning a screw adjacent to the screw that tightens the clamp, the jaws of this connector expand and bite into the box, thus assuring a good ground. No. 7216, similar in construction and equipped with an adjustable clamp, accommodates nonmetallic sheathed cable and the like. Appleton Electric Co., 1701-29 Wellington Ave., Chicago.

Lubrication Fitting

Button-head fitting, for the lubrication of heavy machinery, has a flat face and seat which, when open, offers practically no impediment to free flow of the lubricant. Through expansion of the diameter of the valve-retaining spring, lubricant is able to flow through the center of the spring, not through its compressed coils. Bodies of new fittings are said to be able to stand rough treatment, and have smooth tops to eliminate cutting and wearing of coupling sealing washer. Stewart-Warner Corp., 1828 West Diversey Parkway, Chicago.

Hammer

No. 25 2-in. electric hammer for concrete and masonry drilling and cutting, operates on 110-volt a.c. circuit. Small high-speed blower motor in the handle keeps the



magnet windings cool. The hammer is 16 in. over-all, 3½ in. diameter, and weighs 25 lb. Using star drills, holes up to 2 in. diameter can be drilled in concrete. Using stone points or cold chisels, the hammer cuts holes in masonry floors and walls for risers, doors, windows. Will also drive up to ¼-in. cold rivets. Syntron Co., Homer City, Pa.

Valve

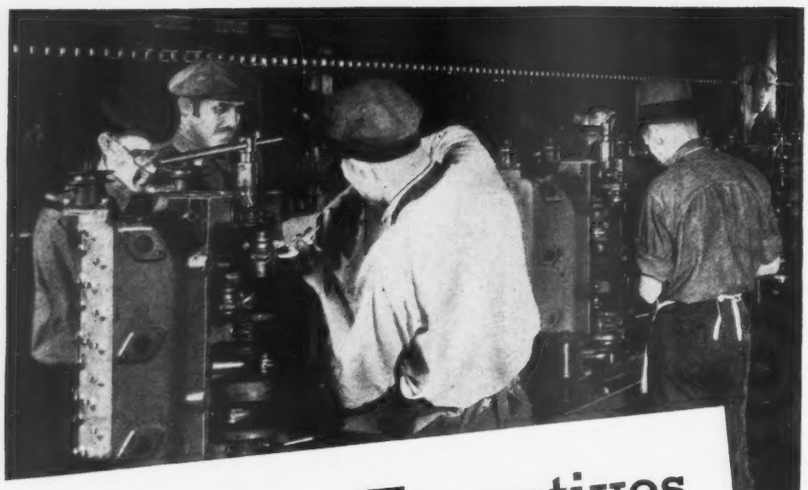
Empty lower section of the coil housing of Type H solenoid valve provides a terminal chamber into which the wires are pushed after making electrical connec-

NO MATTER WHERE_ _ YOU'LL FIND HYATTS THERE!

MERCURY TRAILERS of every type for every material handling job are Hyatt equipped for ease of operation and freedom from bearing wear and care.

Millions of Hyatt Roller Bearings are in operation in all kinds of factory trailers, cars and trucks. And many more are used in all other types of material handling equipment—cranes, trolleys, hoists, conveyors, etc.—Hyatts are everywhere! Designed and built to withstand the strains of punishing loads and speeds, to save on power and maintenance, Hyatts are the preferred bearings for this service. If you are contemplating new equipment, look for Hyatt Roller Bearings and their freedom from bearing wear and care. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey, Chicago, Pittsburgh, Detroit and San Francisco.

HYATT *Roller* BEARINGS



Production Executives

INTENT ON MAJOR SAVINGS

Turn to Oilgear

Time after time when sales and cost minded production executives have wanted to institute a major betterment in plant operation, they have turned to Oilgear Engineering Service and Oilgear Equipment.

For Oilgear Fluid Power is a unique power . . . with unique advantages . . . almost universal in its application. It is a driving motor, it is a transmission either inbuilt or separate from the process it serves, it is a cushioned, controllable infinitely variable and smooth power which can be made to do the most amazing feats. In a form amazingly enduring, efficient, compact and useful.

What is OILGEAR Fluid Power?

OILGEAR Fluid Power transforms energy from any constant speed source into rotating or reciprocating motion of steplessly variable speed, forward or reverse. The heart of OILGEAR, the efficient OILGEAR pumping mechanism, transforms mechanical power into an oil flow, in turn converted into controllable rotation in an OILGEAR oil-motor or into controllable reciprocating motion in an OILGEAR cylinder. The medium of transmission, oil, results in cushioned power, simple but positive control, self-lubrication, high efficiency and negligible maintenance. . . . Industry's uses for OILGEAR are legion. Conveyors, paper making machines, printing presses, machine tools, coating machines, thousands of operations made possible and practical. Both machinery users and designers will find much profit in a thorough understanding of OILGEAR possibilities.

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To SPEED UP operations
To reduce TOOL BREAKAGE
To cut down HIGH UPKEEP
To stop FREQUENT SHUTDOWNS
To gain SYNCHRONIZED PRODUCTION
To get PRECISE SPEED CONTROL

These and many other problems are answered by Oilgear Engineering and Oilgear Equipment. Let an Oilgear Engineer put the FACTS before you. THE OILGEAR COMPANY, 1324 W. Bruce St., Milwaukee, Wis.

OILGEAR *Fluid Power*

TRANSMISSIONS • PUMPS • MOTORS • FEEDS

tions. An adaptor receives a straight or angle BX connector or conduit lock-nut. For cord connections, a porcelain bushing is inserted in the adaptor. Opening and closing "click" of valve is silenced by a "composition tip" in the impulse plunger and another at the upper end of the plunger travel. A plug containing the seat is removable for cleaning. Available in pipe sizes ⅛, ¼, or ⅜ in. with $\frac{1}{16}$- and ⅛-in. diameter orifice, for the control of water, air, gas, oil, or steam. Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.

Inhalator

Inhalator, for treating cases of gas poisoning, can be used with compressed oxygen tanks of three capacities without using special adaptors. For ordinary emergency

work, two 16-cu.ft. cylinders containing a mixture of oxygen and carbon dioxide are carried in the inhalator case ready for use. For an additional supply, a 50- or 220-cu.ft. tank can be connected directly to the pressure-reducing valve. The breathing bag, pressure-reducing valve, and cylinders can be removed from the case and the bag placed close to the patient—as on a stretcher or bed. To treat two patients simultaneously, a second facepiece may be attached to the breathing bag without supplemental equipment. Davis Emergency Equipment Co., 55 Van Dam St., New York.

Comparator

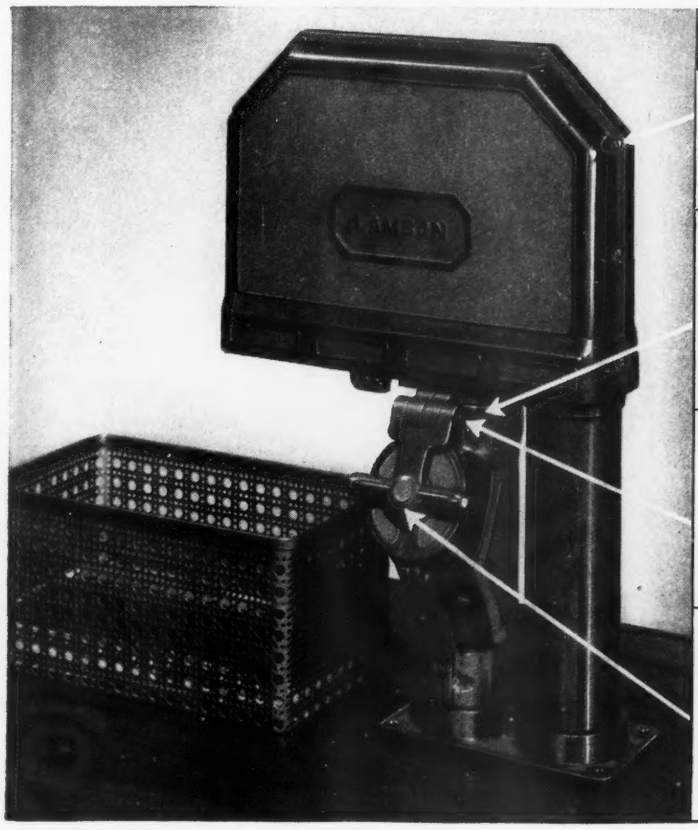
Small comparator, Model 35B-8, may also be used as a general-purpose gage. The collar, table-supporting bracket, and smooth-ground table are adjustable for height. The indicator, furnished with direct-reading double dial, and "tell-tale" hand, is equipped with lifting lever and Bezel clamp. Graduation: 0.001 in. Range: 0.300 in. Capacity: 2 in. Table adjustment: ½ in. Federal Products Corp., 1144 Eddy St., Providence, R. I.

Putty Knives

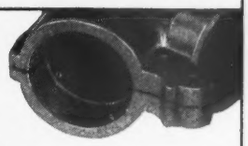
"Red Devil" P 13 putty knives and wall scrapers have red Tenite handles that will not chip or break when dropped. High-

Gain Shortcuts in Assemblies

WITH BAKELITE PLASTICS



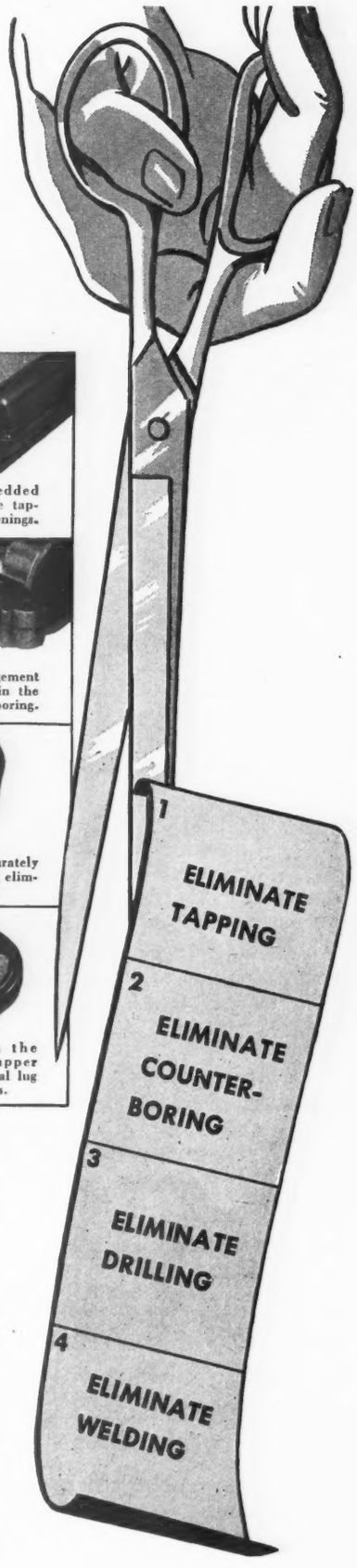
1 Permanently-embedded threaded inserts save tapping for screw fastenings.



2 Accurate end-enlargement of holes completed in the mold saves counter-boring.

3 Through-holes accurately positioned in molding eliminate drilling.

4 A lug formed on the Bakelite Molded clapper saves welding of metal lug to metal clappers.



CUT your assembly time and costs *to the bone*, by using housings or other product-parts made from Bakelite materials! Several time-consuming assembly operations often can be completely eliminated...others may be replaced by simpler, speedier methods.

For example, take the Lamson dispatch terminal illustrated. More than a dozen machining and fastening operations are saved or speeded-up by producing this complete housing from seven Bakelite Molded parts.

Four typical short-cuts gained by use of Bakelite Molded in the Lamson terminal are shown and described above. Others include: permanent positioning and fastening of metal liners during the molding of the Bakelite material, and savings in the finishing of butt joints.

This is just one example of the many savings you can gain with Bakelite plastics. More than 2000 different materials are available at Bakelite Plastics Headquarters to assist you in lowering production costs. Write for Portfolio 16 of descriptive booklets.

Bakelite Corporation, 247 Park Avenue, N.Y.
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BAKELITE

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the name "B" is the numerical sign for effects or untested qualities. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

PLASTICS HEADQUARTERS

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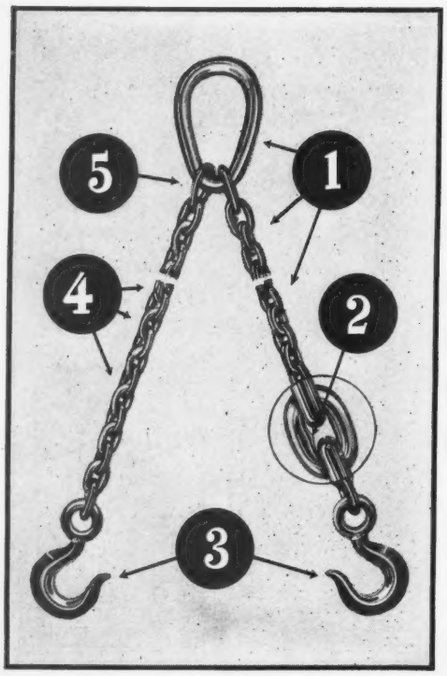
GETS A NEW MEANING IN

HERC-ALLOY sling chain

Special high grade alloy steel . . . heat treatment under precision pyrometer control . . . exclusive process electric welding—these are the key factors that put HERC-ALLOY Sling Chains in a performance class by themselves. Yes, here is an out and out "double duty chain"—strength *plus* endurance for industry's toughest assignments.

Put this *brute strength* to work on your heavy materials handling jobs—and put an end to hazards to life, equipment and products. Long-wearing, resistant to bending and gouging, easy to handle, HERC-ALLOY Sling Chains are famous time and money savers. Check closely HERC-ALLOY features below—convince yourself that here is downright super-built quality in every detail.



1. Heat Treated HERC-ALLOY throughout the entire chain to give maximum uniform strength.
2. Links are INSWELL Electric Welded by a new process fully covered by patents.
3. HERC-ALLOY Heat Treated Hooks give maximum strength at these vital points.
4. Short, narrow links reduce to a minimum the danger of bending or gouging when used around sharp corners.
5. All Joiner Links are of Heat Treated HERC-ALLOY.

Descriptive Folder on request

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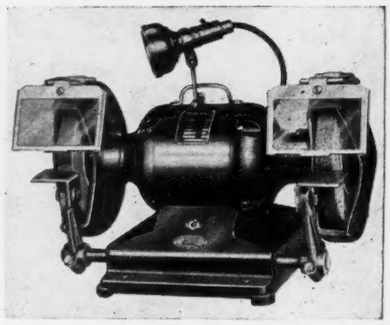
130 FREMONT AVE. TONAWANDA, N. Y.

In Canada: McKinnon Columbus Chain, Ltd. St. Catharines, Ont.

In South Africa: McKinnon Chain (S. A.) Ltd. Vereeniging, S. A.

Designed and built by **COLUMBUS-McKINNON**

carbon tool steel blades are oil hardened and tempered, and are riveted to the handles. Knives are available in stiff and flexible models with 1¼-, 1½-, and 2-in. blades; scrapers in stiff, flexible, and super-flex models with 2½-, 3-, 3½-, and 4-in. blades. Landon P. Smith, Inc., Irvington, N. J.



Bench Grinder

"De Luxe Heavy Duty" electric grinder, for general shop work, tool sharpening, wire-wheel brushing, and buffing, features an adjustable lamp having a blue lens that throws a flood of "daylight" light on the work. The lamp has an on-and-off switch and operates on a 6/8-volt tap-off from the grinder windings. Adjustable, shatter-proof, safety eyeshields mounted in front of the grinding wheels provide protection against flying particles. Grinding wheels are 7 in. in diameter, with a 1-in. face—one fine-grain and one coarse-grain—and are protected with wheel guards. Over-all spindle length, 19 in. Totally inclosed motor is equipped with a toggle switch. Diehl Mfg. Co., Elizabethport, N. J.

Welding Fittings

Forged steel socket fittings for small welded lines are designed especially for welding, the socket wall being proportioned to assure uniform heat distribution

and proper penetration. The socket is deep to provide liberal "come and go" in assembling the pipe, and to provide for variations in pipe lengths, thus eliminating the need for careful measuring and cutting. For working pressures, the fittings are made of carbon steel. For higher pressures, they

PICTURE OF A PROFIT-STORY

Large illustration: *Magnified photograph of heavy, long, curling chips produced with Disston Bite-Rite File.*
Inset: *Light, short, crushed chips produced with ordinary file. Both photographs same scale enlargement.*

...told by filings produced with Disston BITE-RITE file

Filings tell a story of profit... for you! Heavy, long, curling chips—like chips from a lathe tool—require fewer strokes. That means *faster* filing. And the time your men save, plays a substantial part in your profits.

Compare these filings, made with a Disston Bite-Rite File—characteristic of the Disston tooth design and free gullet—with the short, crushed, clogging fragments of chips made with an ordinary file (*inset*).

There you have a picture of your profit-story!

Change to Disston Bite-Rite Files now. Get a new kind of profit from Bite-Rite staggered tooth design, smooth-cutting face, sturdy, non-clogging gullet. Henry Disston & Sons, Inc., Philadelphia, U.S.A.

GET DETAILS ABOUT SPEED IN PRODUCTION, SMOOTHNESS OF FILED SURFACE, FROM THE DISTRIBUTOR OF DISSTON BITE-RITE FILES WHO SERVES YOU

DISSTON BITE-RITE FILE

PUT *Yourself* IN THE BOSS'S SHOES

Show Him How

THIS NEW IDEA SAVES MONEY

Does your boss know that Delta Drill Presses are the finest labor-saving machines you can have in your shop? We will appreciate it if you show him how—in addition to handling their regular jobs of production drilling and tapping—these low-cost Drill Presses can be used to get additional operations at no *direct labor cost!* Delta Drill Presses are portable and self-contained. They may be placed along side other machines, such as a milling machine, so that the milling machine operator can operate the Drill Press during the cutting period of the milling cycle. In this way, labor costs on many operations can be entirely eliminated! This is but one of the many applications whereby Delta low-cost tools bring extra profits. Want to know more? Let us send you complete information today. Just send the coupon.

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Please send me complete information on Delta low cost high-efficiency power tools.

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Firm .....
Address .....
City ..... State .....

are made of carbon-molybdenum steel. Available in ½- to 2-in. sizes, depth of socket $\frac{7}{8}$ to 1 in. Crane Co., 836 South Michigan Ave., Chicago.

Reflector

Concentrating-type fluorescent lamp reflector of specular-finish Alzak aluminum is made in three lengths: 18, 24, and 36 in. It is parabolic in shape and has an adjusting feature that permits the reflector to be set in a normal position, a tilted maximum angular position of 45 deg., or an intermediate position of approximately 22½ deg. Wiremold Co., Hartford, Conn.

Hole Saws

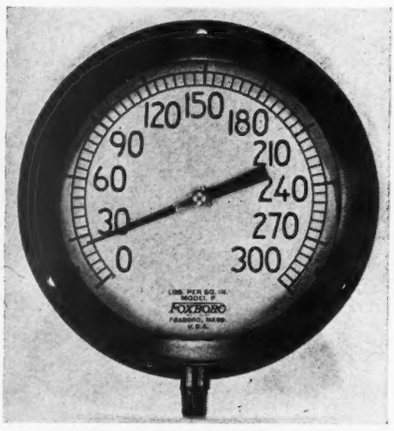
Hole saws are made in one piece of 18 per cent tungsten high-speed steel to cut fast and retain a sharp cutting edge. Diameters range from ¾ to 3½ in. Saws are used with electric drills of ½-in. capacity or larger for cutting clean holes in sheet metal, pipe, cast iron, wood, tile, plaster, marble, Bakelite and other composition materials. Skilsaw, Inc., Dept. B, 3316 Elston Ave., Chicago.

Linestarters

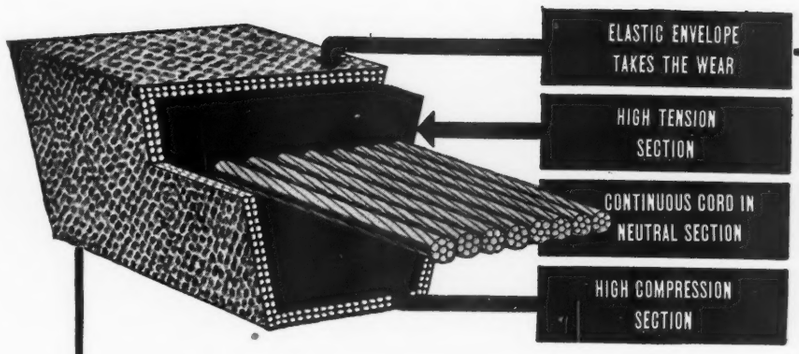
Non-reversing linestarters for squirrel-cage and wound-rotor induction motors are applicable to pumps, compressors, fans and blowers or any application requiring push-button or remote control in across-the-line starting. Features include low-voltage protection or release through low-voltage relay, bimetal type of overload relay, hand or automatic reset, saturated current transformers insuring protection on slow-starting applications, strong magnetic blowouts insuring arc-rupturing capacity. Available in 300-, 600-, 750-, and 1,200-amp. rating operating on commercial voltages. All ratings are 2- or 3-phase, 3-wire. Westinghouse Electric & Mfg. Co., East Pittsburgh.

Gage

Absence of solder and bronze in the all-welded steel construction of the Model



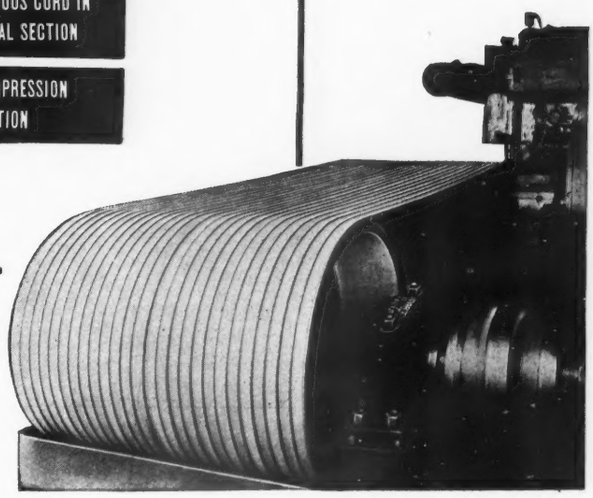
P indicating gage removes fire risk and eliminates danger to gage of fumes or vapors corrosive to bronze. Threaded rings, equipped with gaskets, protect the gage against moisture and vapor. Segments and pinions have milled teeth to



Their Balanced——

GROOVE-GRIPPING ACTION

Gives You Maximum Power Transmission ~ **AT MINIMUM COST**



New MEDART V-BELTS

"They Grip the Grooves"

The New Medart V-Belts with their "groove-gripping" action are precision engineered and constructed—assuring maximum power transmission—*at minimum cost.*

The load-carrying cord section of the belt is concentrated at the neutral axis of the belt assuring minimum friction and safeguarding the tension-carrying element from internal breakdown.

Further—each strand in each individual belt, as well as each belt in a multiple drive, carries its proportionate share of the load. . . . This results in smooth, uniform action—permits maximum belt tension—eliminates undue wear or strain—prolongs belt life.

Investigate Now the money saving advantages you get with these new Medart V-Belts. "They Grip the Grooves."

Get in Touch with Your Medart Representative or Distributor. They will assist you in the selection of a complete V-belt drive that will give you continuous, trouble-free service at the lowest cost.

THE MEDART COMPANY

3512 DeKalb St. • • • St. Louis, Mo.

MEDART

3 OF THE *Many* USES WHERE

MASKING

HOLDING

PROTECTING

SCOTCH ADHESIVE TAPES

Simplify industrial operating problems and help to save time and materials.

Scotch Adhesive Tapes are easily applied without moistening. They are made with varying strength of backings ranging from heavy extra strength to tissue thinness and with varying adhesive properties.

There are tapes for holding, splicing, protecting, sealing, reinforcing, electrical work and for identifying purposes. Tapes that will withstand temperatures where baking operations are necessary.

Try Scotch Adhesive Tape—a sample roll is yours for the asking.

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Saint Paul, Minnesota
Gentlemen:
Please send a sample roll of Scotch Adhesive Tape to be used for.....
.....
Name.....
Address.....
City..... State.....
Signed.....

Made and Patented in U. S. A. by

MINNESOTA MINING & MFG. CO.
SAINT PAUL MINNESOTA
The Desire To Serve The Ability To Produce

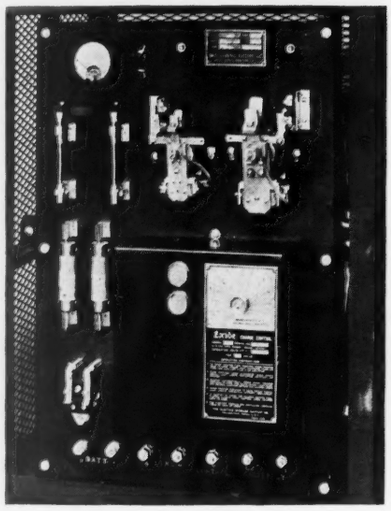
Under one or more of the following U. S. Patents: Nos. 1357030, 1779160, 1854986, 1914132, 1899979, 1930413, 1954885, Re. Nos. 18543, 19128.

Canadian Manufacturers and Distributors CANADIAN DUREX ABRASIVES, Ltd., Toronto, Canada

insure smooth operation. Movement plates, columns, links, shoulder screws, pointers, and dials are of stainless steel. A 270-deg. bourdon spring permits use of springs double the range of gage without increasing movement multiplication or decreasing accuracy; chrome molybdenum steel is used for ranges up to and including 1,000 lb.; above that, nickel steel tubing is used. Test gage has ranges from 0-15 lb. to 0-10,000 lb.; refinery gages, ranges 0-60 lb. to 0-2,000 lb.; and hydraulic gages, ranges 0-600 lb. to 0-10,000 lb. The Foxboro Co., Foxboro, Mass.

Battery Control Unit

Model ES charge control unit for stationary batteries aims to reduce amount of



manual supervision required to increase battery life, and to reduce charging current costs. For use with either bulb or dry-disk types of rectifiers, d.c. generators, or d.c. bus with charging resistors. Has small, self-starting, synchronous motor-driven interval time switch operating from a 60-cycle a.c. supply that starts the charge or increases it once every hour by resetting a temperature compensated relay which in turn operates an auxiliary relay. A continuous-charge toggle switch is provided to discontinue the automatic charging feature when desired. The Electric Storage Battery Co., Allegheny Ave. and 19th St., Philadelphia.

Die-Handling Truck

Type ELN-16 die-handling truck, equipped with battery or gas-electric unit, has a rated capacity of 16,000 lb. It has a 2-wheel drive and 6-wheel steer, and a pull-on, pull-off, hoist for handling dies. Trail axle is of the compensating-rocker type, having steering levers above axle for load clearance and accessibility. The Elwell-Parker Electric Co., Cleveland.

Fluorescent Lamp Fixture

Fixture for 18- and 36-in. fluorescent lamps comes in two sizes. To insure high factor of reflection, the fixture is finished inside in three coats of white porcelain enamel. Can be mounted singly or in parallel or linear rows to suit individual lighting problems. Low operating

with BRIDGETON SAND CO., *its* THERMOID HOSE

Here's a unique installation of Thermoid Hose that not only solves a number of problems . . . but that is turning in a typical Thermoid record for high product efficiency and performance.

Through the use of ten connections made of Thermoid Suction Hose, varying in length from 2 feet to 16 feet, the Bridgeton Sand Company of Williamstown Junction, N. J., have made their pipe line completely flexible. This is necessary so that the dredge may be moved to any section of the water . . . and also because of the irregular surface of the ground over which the line runs to the plant. The total length of the line from dredge to plant is 2500 feet, operating under a pumping pressure of 65 pounds per square inch at all times and handling an average of 1000 gallons of sand and water per minute.

Both the Thermoid Suction and Discharge Hose used on this job have been in service for over a year and a half, and in its present condition, it is expected to at least double this service before *any* repairs will be needed.

If you have a hose requirement that takes "sand" . . . or handles sand . . . you may be sure that Thermoid can supply *you* with the *one* hose best suited for the job. Your jobber or Thermoid will be glad to give you specific information on your particular job.

More than half a century of progressive engineering and product development.

THERMOID RUBBER, DIVISION OF THERMOID COMPANY, TRENTON, N. J.

Standard types of belting made by Thermoid:
Transmission Belting
Conveyor Belting
Multiple V Belts
Grader Belting
Canners' Belting
Bucket Elevator Belting

Thermoid

Standard types of hose made by Thermoid:
Air Hose
Water Hose
Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

BELTING HOSE PACKINGS BRAKE LININGS

A YALE STORY OF SAFETY

That's what happens every time a load is lowered on a Yale Hand Lift Truck—Check and Double Check! For the Yale Release Check has a concentrated cushioning action that makes it doubly efficient—a safety factor that always protects load, truck, operator and floor.

In order to make this check as perfect as possible, Yale engineers have considered every mechanical factor. That's why it's placed in the center of the truck where load strains are uniformly balanced—and is protected from injury by a heavy channel cross member.

It also features a high carbon ground piston rod guided in a bronze bushing. This is one piston rod which will not buckle! In addition, there is an extra capacity oil reservoir with an automatic oil seal that prevents leakage. Once the oil is in, it stays there. And as a final indicator of the Yale Release Check's quality manufacture, there is the highly precisioned automotive type piston ring.

With this check on the job the load is never dropped—It's gradually lowered!

YALE

THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, PHILADELPHIA, PA., U. S. A.
IN CANADA: ST. CATHARINES, ONT.

temperatures of the lamps permit close mounting. Goodrich Electric Co., 2900 North Oakley Ave., Chicago.

Blower

"Airmaster" 2-speed portable blower combines high speed and low speed in one tool thus extending its use as a portable blower and giving it a safety feature—danger of losing balance when operating blower on a high ladder is reduced as operator can start at low speed and increase to high speed without much additional torque. It is capable of developing a velocity of 20,500 and 26,000 lineal ft. per min., with capacity of 125 and 176½ cu.ft. per min., and static pressure of 36 and 48 in. Can be used with standard attachments as a suction cleaner or sprayer. Skilsaw, Inc., Dept. B, 3316 Elston Ave., Chicago.

Ventilator

"Health-Air" room ventilator, for all-year use, ventilates the office or room in which it is installed, cleans and circulates the air, and acts as a noise eliminator. Inclosed in a steel cabinet, it measures 16x8x14 in. It is equipped with two blower-type fans propelled by motors that produce 125 hp., a replaceable filter that is said to eliminate at least 90 per cent of dust and pollen from the air, louvers that regulate direction of air, damper that cuts air off partially or wholly, and rheostat that increases or decreases speed of air intake. Operates on a.c. and can be supplied for d.c. The Ad-Lee Co., 825 South Wabash Ave., Chicago.

Fire Nozzle

CO_2 baffle-type nozzles are said to provide a non-turbulent distribution of gas from carbon dioxide fire-extinguishing systems by reducing the velocity and pressure of the discharge, and permitting rapid ex-

(*Continued on page 90*)

SAVED $300 ANNUALLY ON OIL COOLER CLEANING

NONPAREIL TURBINE OIL

● THAT IS just one of the savings which M. B. Gouty, Chief Engineer at the City Light and Power Company plant, Fort Wayne, Indiana, knows he has made since changing to Nonpareil Turbine Oil. But here's his experience with Nonpareil told in his own words.

"The oil was placed in our turbine in November, 1934 and July, 1935 on 15,000 and 7,500 KW units respectively. The total capacity of these systems is 25 bbls.

"Since the oil has been in service we have not found it necessary to clean the coolers at all and the filter bags have been cleaned only twice in four years to remove dirt introduced from the outside. Every part exposed to the oil is as clean and bright as when the oil was first placed in operation.

"To date only three barrels of make-up oil have been added to the original fill. The 15,000 KW machine has been idle a total of only ten days in this time with one continuous run of fourteen months."

Nonpareil is *guaranteed* to give this same clean, cost-reducing service for the *life* of this turbine. Let a Standard Oil representative point out other ways in which you save money with Nonpareil.

Copr. 1939, Standard Oil Co. (Ind.)

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WHAT DO YOU WANT TO KNOW ABOUT LUBRICATION?

SEE OTHER SIDE ➤

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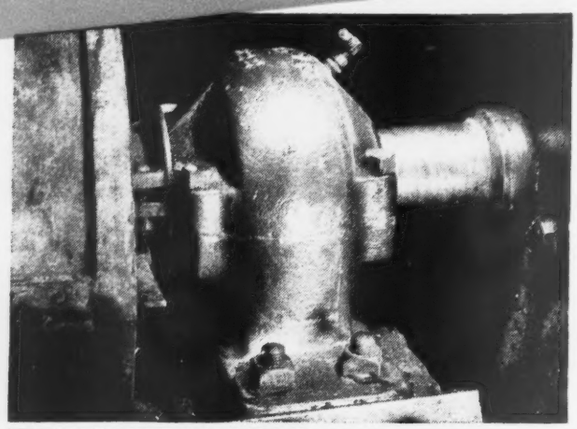
ERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICA

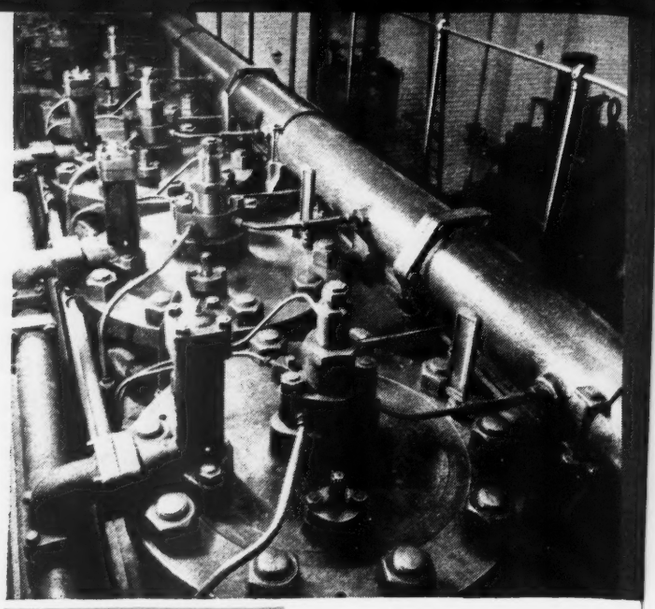
HERE'S MORE PROOF THAT...

THE RIGHT LUBRICANT PROPERLY APPLIED REDUCES COSTS



SUPERLA GREASE

Bearing failures on the motor driving a ventilator were so frequent that the plant engineer found it necessary to keep a reserve motor in readiness at all times for replacement. In addition to high labor and material costs for replacing these bearings, grease consumption was excessive. When a Standard Lubrication Engineer was consulted he carefully analyzed the operating conditions—bearing pressure, temperature, speed, etc. He recommended that the bearings be cleaned thoroughly and Superla Grease No. 2X put in. With the *right product*, Superla, *properly applied*, not one bearing has failed on these motors. You can get this same cost-cutting service on any lubricating problem in your plant from *your* Standard Lubrication Engineer.



NONPAREIL DIESEL OIL

Before installing an 800 HP Diesel a large milling company made several tests of various Diesel oils on a 360 HP unit in the plant. Based on these preliminary tests Nonpareil Diesel Oil was chosen for use on the new unit. Then, after 14,000 hours of operation the new unit was taken down and inspected. There were no stuck rings and only .006 to .013 of an inch of wear on any cylinder. Almost two years of operation and not one cent for maintenance with Nonpareil! There's only one way you can tell how much Nonpareil can save for you. Test it. A Standard Lubrication Engineer will be glad to help.

Standard Lubrication Engineers are located in 28 offices throughout the states shown above. They are there solely to help you make better use of the highly developed lubricants in Standard's line—to make your lubricating dollars go farther.

Call in your Standard Lubrication Engineer. Have him explain more fully just what he does. Write Standard Oil Co. (Indiana) 910 S. Michigan Ave., Chicago, Illinois for the Engineer nearest your plant.

WHAT DO YOU WANT TO KNOW ABOUT LUBRICATION?

Bulletins containing information on the lubrication of practically every type of plant equipment are available to plant operating men in the 13 states shown above. These Engineering Bulletins should not be confused with ordinary sales literature. They discuss in a semi-technical manner the various types of equipment requiring lubrication—their design, operating characteristics and lubrication requirements.

Check the subject in which you are most interested and drop the postcard in the mail.

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OF YOUR WORKERS' EYES . . . *protect them with Safety Goggles*

Your workers' eyes are *your* responsibility. When an eye accident happens a workman suffers and you pay . . . *keep on paying.*

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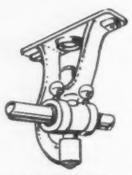
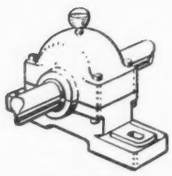
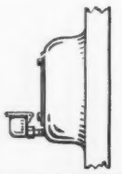
SOUTHBRIDGE, MASSACHUSETTS

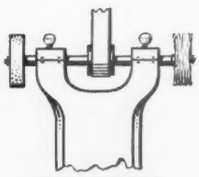
LESS OIL... LESS OFTEN


LINE SHAFTING


PILLOW BLOCKS


SPRING CAP OILERS

for


BUFFERS, GRINDERS

OPEN BEARINGS

Yes! . . . "Less oil—less often" . . . a slogan written by all industries the country over! Plants everywhere, on changing to STA-PUT, have invariably experienced the same benefits . . . 50 to 75% savings in oil and oiling labor costs, cooler bearings, and almost complete elimination of leaking.

This is not only true of open bearings, but also of many different applications such as motors, gears, machine tools, etc. These specially treated, leak-resistant lubricants are available in all viscosities, and may be so used as to require fewer grades.

Don't take our word for it! Find out for yourself the conservative truth in these statements. A small quantity will convince you of the unequalled value to be gained through the use of STA-PUT Lubricants. Write for sample, or send for the Houghton Man.

E. F. HOUGHTON & CO.

240 W. SOMERSET ST.
PHILADELPHIA

Chicago Detroit

STA-PUT LUBRICANTS

(*Continued from page 86*)

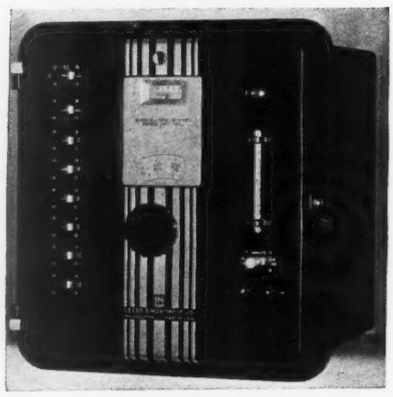
pansion and non-violent penetration of the gas throughout the entire protected area. C-O-Two Fire Equipment Co., Newark, N. J.

Pressure Jet

Pressure jet eliminates rust, scale, corrosion, and congestion in high- or low-pressure steam lines through atomization and injection of a special eradicating material into the lines. Only two connections are made on the steam mains. It is said the equipment and materials are effective in removing incrustation without interruption of steam service, and in speeding up the transmission of steam heat in processing, heating, manufacturing. The North American Fibre Products Co., Keith Bldg., Cleveland.

Temperature Indicator

Switchboard indicator or cabinet-mounted unit enables an operator to measure temperatures of near or distant thermocouples by turning a knob until the pointer comes to zero and reading a 12-in. temperature scale. Potentiometer measuring circuit reduces uncertainties due to circuit-resistance variables. Can be calibrated for single or double range, the latter for use with similar or different thermocouples.



Built-in terminals, check key, and mercury thermometer can be included for checking with a portable indicator. Rigid metal case for flush mounting in panel may be equipped with hangers for surface mounting on wall or panel. The galvanometer is replaceable. A red disk appearing above the indicator scale warns that the dry cell must be renewed. Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia.

Flexible Shaft Unit

Multi-speed, floor-type, "Motor-flex" unit is available in three general types: ¼-hp. motor with light-duty shaft; 1/3-hp. motor with medium-duty shaft; ½-hp. motor with heavy-duty shaft. Hinged construction of jack-shaft permits quick adjustment of belt tension and quick change of pulley speeds. The Martindale Electric Co., Box 617, Edgewater Branch, Cleveland.

Pipe-Threading Machine

Model C portable unit threads up to 2-in. pipe with full-width solid dies, threads bolts up to 1½ in., and operates

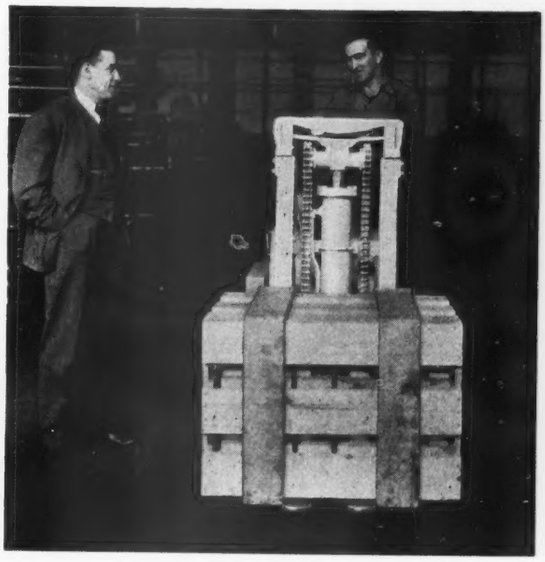
Labor has a right to a better job.

At last!

CLARK CARLOADER

a power wheelbarrow that will cut handling costs at every handling point in ANY plant

Write for "The Clark Carloader Method" Booklet



"Stubby"—one of eleven models—lifts, carries, tiers ton loads—is 38 in. wide, under 5 ft. high.

$1875.00

and up, F.O.B. Battle Creek

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Div. of Clark Equipment Co.

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WALDRON *Flexible* COUPLINGS

a Type and Size for Every Purpose

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Torque Ring
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Most complete line of forged steel couplings for all drives, all loads. Advanced design and construction improvements insure trouble-free operation. Low initial cost. Write for catalogs giving sizes, service factors, prices. No obligation.

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TO MAKE ANY KIND OF TOOL

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With its help more than 8000 tool makers are showing their companies how to get bigger production and how to lower costs. You will gain from it information formerly available only from steel mill experts—information in simple non-metallurgical terms that will help you gain more complete control over the progress of your work. With this convenient, beautifully bound handbook, you can readily answer most questions that come up in the tool department. Use this convenient coupon to get your copy.

READ THIS COMMENT

"Here is a volume which the author calls a handbook but which is very much more. There is no question but that every tool maker and four out of five metallurgists, will know more about tool steels and their treatment after reading it."—*From a review by* K. H. CONDIT, Consulting Editor, American Machinist.

Quick Answers To Questions Like These

HOW to stop tools from warping.
HOW to avoid grinding checks.
HOW to make tools wear longer.
HOW to make tools that won't break.
HOW to prevent size change.
HOW to make the spark test.
HOW to be a trouble shooter.

THE CARPENTER STEEL COMPANY, Dept. A-13, Reading, Penna.

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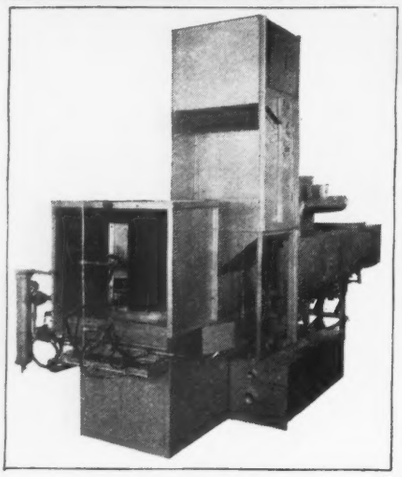

DEVILBISS

PRODUCT-FINISHING EQUIPMENT

POINTS THE WAY TO FINER QUALITY...REDUCED COSTS

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DeVilbiss Automatic Equipment has been a *helping hand* to industrial executives faced with increasing costs—a *guiding hand* to greater efficiency and new economies in finishing products.

The DeVilbiss automatic hand has behind it 50 years of experience in designing, developing and building spray equipment to higher standards of operating efficiency . . . It gives product-finishing the skill of veteran craftsmen stepped up to modern day speed. At its finger tips is DeVilbiss Equipment for *every step* in the finishing process—for products large or small—for any plant operating condition. For results, records in hundreds of industrial plants show that DeVilbiss product-finishing improves quality—lowers costs.

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Spray finishing equipment
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Air regulators, cleaners and dusters
Air compressors
Respirators
Specialized hose for paint, air, water, gasoline, oil, welding and pneumatic tools
Hose connections
Water and Oil Guns
Paint Stripers

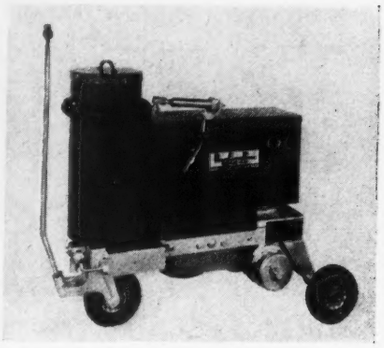
●

For one item or a complete system

Call DeVilbiss

DEVILBISS SPRAY SYSTEMS

geared tools to thread pipe up to 8 in. Gears are inclosed and operate in oil. A turn of the chuck wrench tightens or loosens the chuck. Designed for bench or stand use, the unit weighs approximately 140 lb., stands 12½ in., has a base 18 x 18 in., base dimension mounted on legs, 42 x 46 in. Available with either 110- or 220-volt, ½-hp., universal motor. Beaver Pipe Tools, Warren, Ohio.



Grease Gun

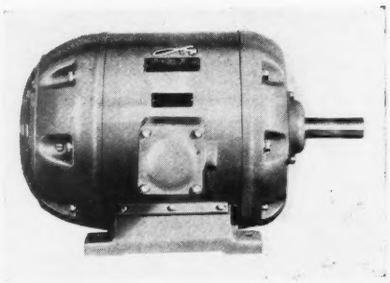
Portable, electric grease gun requires no electric cord, no air hose. Its 19-plate battery is equipped with a built-in charger that reduces recharging operation to plugging extension into a 110-volt a.c. socket. Pressure is adjustable from 1,000 to 12,000 lb. Available in three models: S-38 and S-38-H carry one tank for ordinary grease, D-38 has dual tanks and guns, one set for heavy and one for light lubricant. Tank capacity is approximately 25 lb. The hose is tested to withstand 20,000 lb. pressure. Pressurelube, Inc., 22 East 40th St., New York.

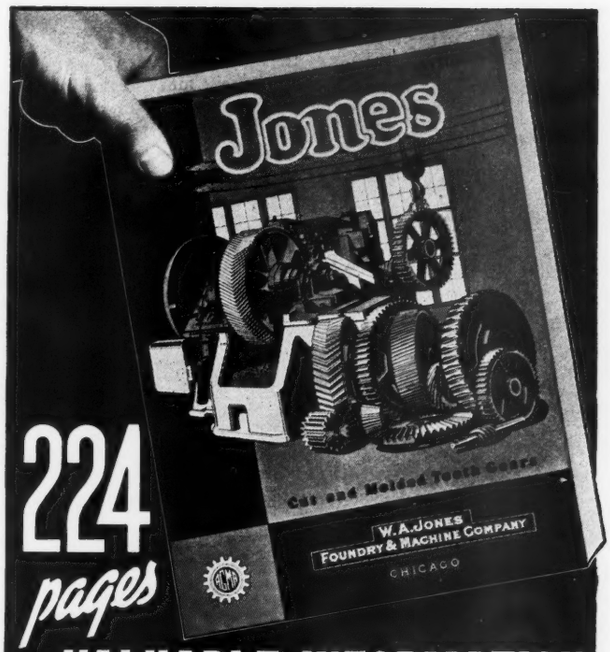
Drill

The $\frac{3}{16}$-in. "Hornet" portable electric drill for continuous operation is compact, light in weight. It is suited for aircraft and light industrial work. Van Dorn Electric Tool Co., Towson, Md.

Motors

Explosion-proof motors for use in Class I, Group D explosive atmospheres, or where gasoline, lacquer solvents, and similar volatile liquids are made, stored, used, or handled, are built for a.c. and d.c. operation. The inclosure is said to have a safety factor of five against likely internal explosion. Extra-wide metal-to-metal fits prevent escape of hot flame in the event of internal explosion. The steel covers are rust-proofed for corrosion resistance. A pre-wound stator core construction facili-





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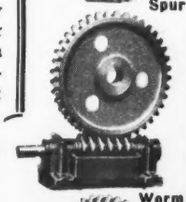
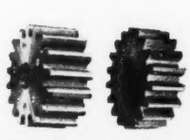
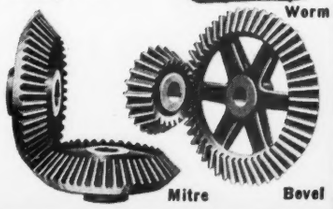
Spur


Worm


Rawhide and Bakelite Pinions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IN the records of rod and reel, there's one fellow who always catches 'em more often . . . one angler *stands out* from the rest. "Fisherman's luck," some say . . . but you know there's a lot more to it than that.

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tates checking windings and insulation. A bearing guard on the shaft ends weatherproofs the motor. Equipped for grease lubrication, they may also be had for oil lubrication. The motors will operate horizontally or vertically. The Louis Allis Co., Milwaukee.

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"Dritherm" infra-red ray lamps for radiant drying and heating purposes are said to have long burning life, high efficiencies, uniformity of filament materials, and rugged construction. Can be used for paint baking. North American Electric Lamp Co., 1014 Tyler St., St. Louis.

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A $\frac{5}{16}$-in. utility ball bearing drill that serves as a general-purpose tool, has added chuck capacity, a no-load speed of 1,100 r.p.m., drilling capacity of $\frac{5}{8}$ in. in steel, $\frac{5}{8}$ in. in hardwood. It is equipped with a universal motor, has splined gear mounting on spindle. For use in general repair and maintenance work, and for drilling with carbon bits. Black & Decker Mfg. Co., Towson, Md.

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Designed to pump water from small-diameter wells (as small as 3 in. in diameter), the "Hi-Lift" pump is capable of lifting 50 gal. per min. 200 ft. with one element, and 50 gal. per min. 500 ft. with two elements. Lifts water 40-1,000 ft. with small variation in capacity or pressure, regardless of height of lift. Operates at 1,760 r.p.m., and is resistant to abrasion. Capacities start at 5 gal. per min. Pressures in excess of 500 lb. are obtainable. Peerless Pump Division, Dept. 201, 301 West Ave. 26, Los Angeles.

Fluorescent Lamps

Fluorescent lamps are available in seven colors including "daylight" and white. The 15-watt, 18-in. length comes in 1- and 1½-in. diameters; 20-watt, 24-in. length in 1½-in. diameter; 30-watt, 36-in. length in

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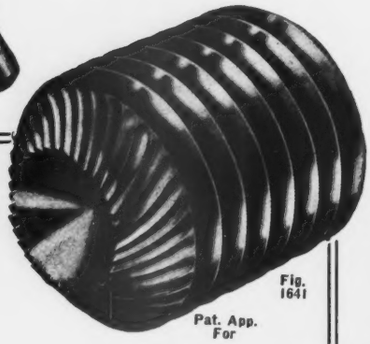

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will protect your machines from accidents or breakdowns caused by ordinary set-screws working loose.

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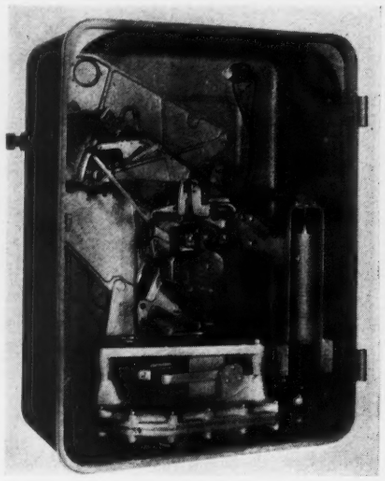
1½-in. diameter: 30-watt, 36-in. length in 1-in. diameter. Low surface brightness of the 1½-in. lamp permits use in direct lighting to high levels of illumination. Higher brightness of the 1-in. lamp makes it effective for attraction lighting, and adaptable for uses in reflector equipment. Auxiliaries—thermal-switch and magnetic-switch types—are available for 60-cycle, a.c. circuits. Available on special order for 50 cycles. Wheeler Reflector Co., 275 Congress St., Boston.

Air Flow Meter

Diaphragm-operated air flow mechanism, for the company's steam flow—air flow boiler meter, simplifies application of



boiler meters to steam-generating units in which high static draft conditions may occur. It records air flow, steam flow, and flue gas temperature on a 12-in. diameter, uniformly graduated chart. The records are distinguished by the use of blue, red, and green inks respectively. Using a large diaphragm which is clamped between the flanges of a metal housing, air flow connections from the boiler to the housing are made so that changes in the differential pressure are measured and recorded in terms of air flow. The diaphragm is made of silk and is coated with a compound rendering it air-tight and impervious to heat and moisture. Bailey Meter Co., 1050 Ivanhoe Road. Cleveland.

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"Pax Type M Soap-Economizer" dispenses powdered soap. By the adjustment of a screw, the dispenser may be set to give as much or as little soap as desired. Made of ebony-black plastic, it is appropriate for installation in factory washrooms and office lavoratories. G. H. Packwood Mfg. Co., 2038-42 Walnut St., St. Louis.

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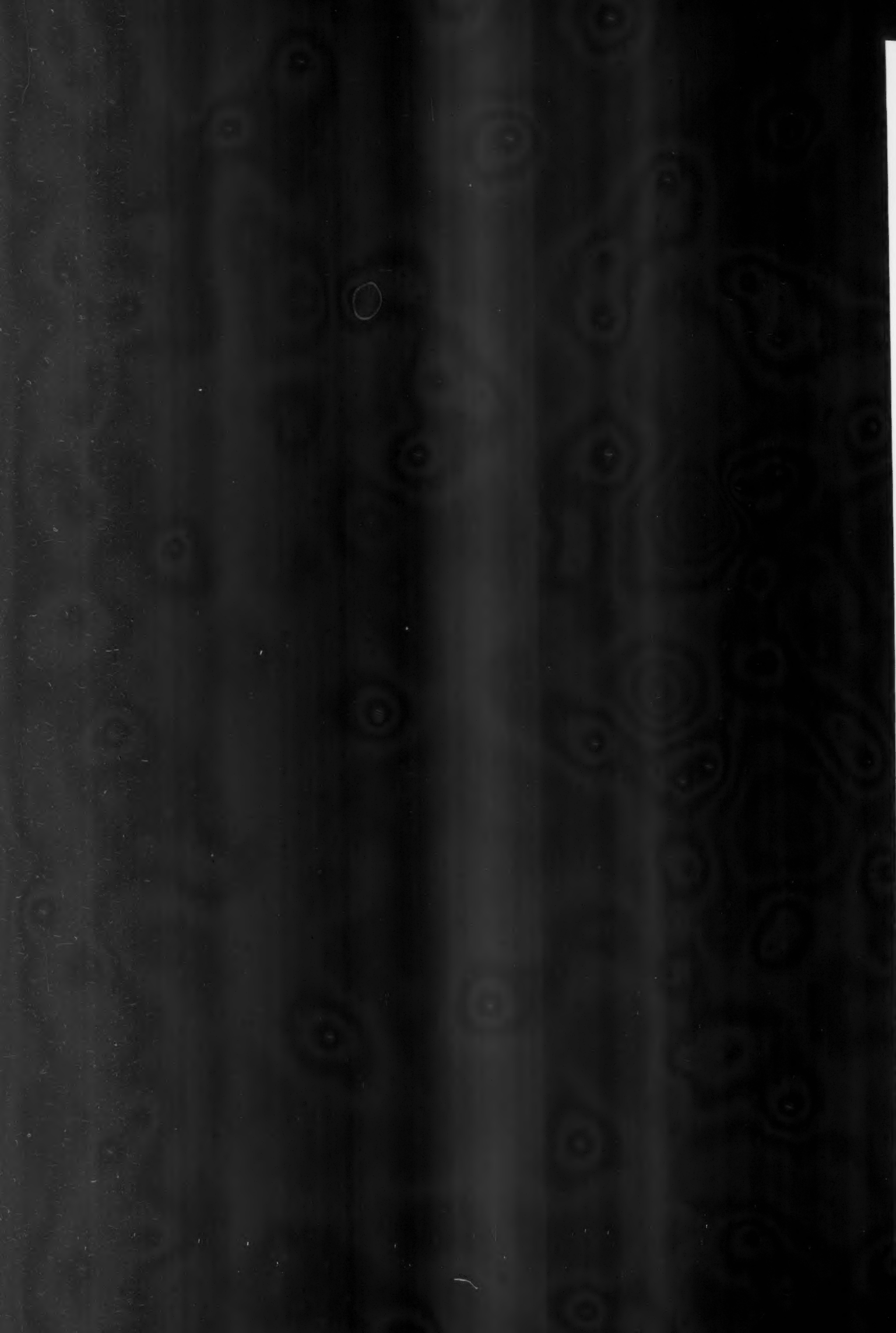
"Polydur" synthetic enamels have short baking schedules, and set out of dust in a few minutes. Baking schedules depend on the temperature employed, but, at 325 deg. F., they are said to bake to a fine, durable finish, without discoloration in 15 min. Available in white and all colors, for spraying or dipping. Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J.



36 YEARS IN THE GAS HOUSE!

Dramatic 36 Year Performance Record of 25 Allis-Chalmers Motors Told by R. B. Brown, President, Milwaukee Gas Light Company! Find Out How Lo-Maintenance Motors with Full Measure Construction Can Save Money for You!

Another true case history from the Allis-Chalmers files that proves **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**

FIGHTING SOME OF THE WORST POSSIBLE CONDITIONS any motors could meet — that's what 25 Allis-Chalmers Lo-Maintenance Motors, like the one pictured above, had to do for 36 years without running up costly repair bills!

Fighting steam and hot coke . . . rain and snow . . . surrounded by some of the worst operating conditions any motor could face — that's what 25 Allis-Chalmers Lo-Maintenance Motors had to meet and beat . . . for 36 years . . . and do it with a minimum of maintenance!

And when R. B. Brown, president, Milwaukee Gas Light Co., tells a sensational performance story like that . . . we give it to you — in his own words — just as he gave it to us in his unsolicited letter of Nov. 29, 1938.

Chooses Allis-Chalmers!

"When our West Side Works was built in 1902," said Mr. Brown "it was the first gas works to be entirely equipped with motors. And those motors were Allis-Chalmers. Steam and hot gases from quenched coke surrounded the motors. Some were installed in wet coal breaker pits . . . in outdoor locations swept by rain and snow. You couldn't have hand-picked a set of worse conditions in which to test motors!

"Last year we shut down this plant. And here's what we found! Those 25 Allis-Chalmers Motors were still going strong! And to top it off, we have had hardly any maintenance expense . . . and not one motor had to be replaced!

"Now I don't know of any other motors that have had such life. And when you add that this plant has operated 24 hours a day, 365 days a year for 36 years — that in itself adds very materially to the job these Allis-Chalmers motors have done!"

It's records like these that prove you get more than just a rated horsepower when you install Allis-Chalmers Lo-Maintenance Motors. And it's records like these that are making men, responsible for production in their plants, switch to Allis-Chalmers!

They know about the high carbon steel frame, indestructible rotor and distortionless stator . . . husky Full-Measure construction with no skimping on materials — that's a combination that knocks their repair bills to a real low!

Get the whole story of how Allis-Chalmers 90 years of advancing with industry works for you when you install a Lo-Maintenance Motor. Call the nearest district office or write direct to Allis-Chalmers. That's the way to get started on cutting your maintenance costs . . . keeping your production steady!

MOTORS FOR ALL APPLICATIONS FROM ½ HORSEPOWER AND UP

1070

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Get the Story on the Fast-Selling New Allis-Chalmers Vari-Pitch Speed Changer! Find Out How This Popular Variable Speed Changer Cuts Operating Costs . . . Saves Time, Power, Space . . . Makes Your Machines Make More Money For You!

If you want the *Extra Profits* that uniform, controlled production pays . . . then you'll want to hear about the sensational new Allis-Chalmers Vari-Pitch Speed Changer! For this new variable speed changer gives you an amazing performance of Up or Down speed changes to suit varying conditions of production . . . operates at the most efficient speed for accuracy and careful finish . . lowers production costs!

Money-Making Performance!

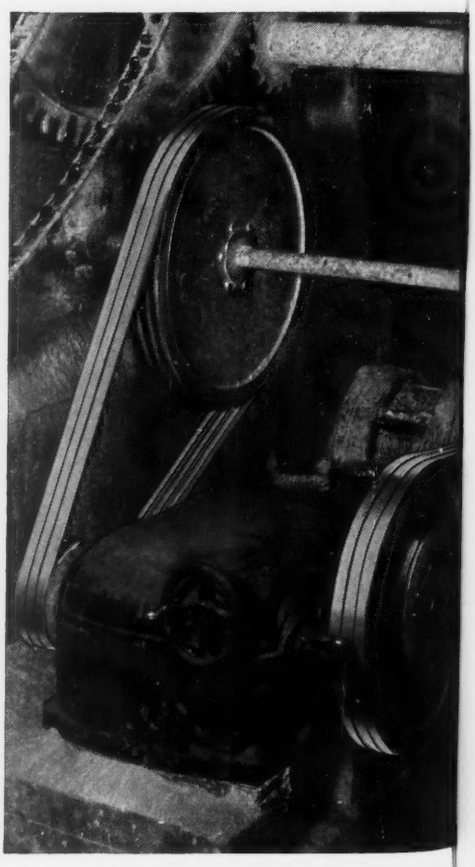
Compare these extra-value features of design and full-measure features of construction! No steps requiring adjustment . . no springs or gears to wear . . . no guesswork in the speed you get! With the Vari-Pitch Speed Changer, speed variations are made to the smallest fraction of an rpm . . . smoothly . . . and they remain constant! Ruggedly built to stand up under all types of loads, it has long life . . . lower maintenance! No other variable speed changer has all these features . . . can give you the same, efficient money-making performance!

Make It Work For You!

Make the Vari-Pitch Speed Changer work for you! Its compact flexibility permits a saving of 2/3 to 3/4 in space over bulkier transmissions.

Get the complete story on this important money-saver! Send for Bulletin 1266 or let a trained engineer in the Allis-Chalmers district office near you show you how you can make your machines produce more AT LESS COST!

Available in sizes from 1 to 75 hp, ratios up to 3¾ to 1, maximum output speed 3500 rpm, the Vari-Pitch Speed Changer is a product of Allis-Chalmers, originators of the Texrope Drive and the Vari-Pitch Sheave.



PROVIDING ACCURATE, controlled speeds ranging from 1.5 to 4 rpm, this Vari-Pitch Speed Changer is doing a money-saving job at a large southern magnesol plant. Note the two Duro-Brace Texsteel Drives.

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1009

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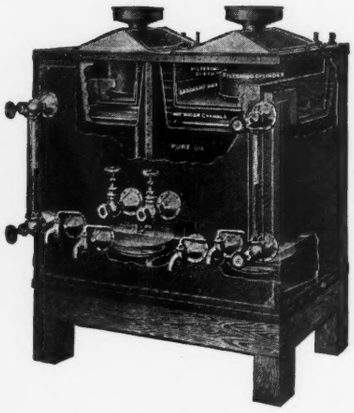

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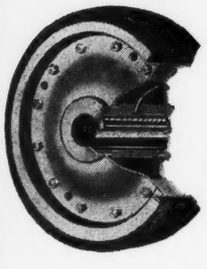

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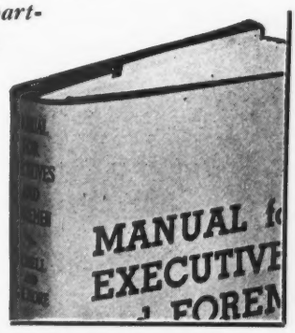

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Bolts, Nuts, Screws, Washers — 1939 Catalog and Price List. Non-ferrous and stainless steel products.—The H. M. Harper Co., 2620 Fletcher St., Chicago.

Boilers—Catalog BT-6. C-E bent-tube boilers—2-, 3-, and 4-drum types. Special designs for capacities ranging from 100,000 to 1,000,000 lb. of steam per hr.—Combustion Engineering Co., Inc., 200 Madison Ave., New York.

Castings — Pamphlet. Stainless steel castings and alloys used.—Smith Steel Foundry Co., 1320 South First St., Milwaukee.

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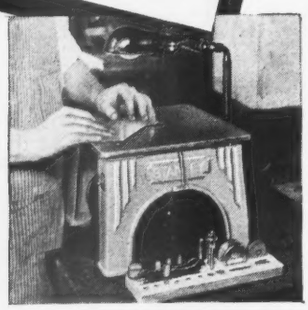

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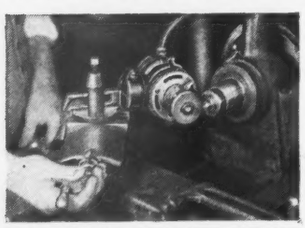

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Cranes—Two Bulletins. C-5: Electrical equipment for cranes operating on a.c. and d.c. C-6: Designs and applications, facts and action photographs on P&H cranes.—Harnischfeger Corp., 4400 West National Ave., Milwaukee.

Diesel Engine—F-M News 12. Discussion of diesel engine economy.—Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago.

Diesel Engines—Form 5179. Craftsmanship and care expended on "Caterpillar" products. Photographs of tests and manufacturing processes.—Caterpillar Tractor Co., Peoria, Ill.

Doors—Bulletin 23. Steel rolling doors, labeled fire doors and shutters, metal rolling grills, "Rol-top" and bifolding doors, door operating equipment, wood rolling partitions.—The Kinnear Mfg. Co., 820-70 Fields Ave., Columbus, Ohio.

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Electrical Equipment — Catalog 391. Safety switches, service equipment, switchboards, lighting and power panelboards, bus distribution systems.—Bull Dog Electric Products Co., 7610 Jos. Campau Ave., Detroit.

Electrical Interlock—Leaflet 2806. For mounting on and controlling a. c. Type F contactors of 200-amp. capacity or less.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Elevators—Section F, Bulletin 95. "Revolvator" for tiering, stacking, and piling materials. Roll router, sidewalk, and telescopic models.—Revolvator Co., North Bergen, N. J.

Fans—Catalog X3349. Desk and stand fans, air circulators, ceiling fans, exhaust and ventilating fans.—The Emerson Electric Mfg. Co., St. Louis.

Feed-Water Control — Bulletin 105. Three-element, air-operated feed-water control for boilers.—Bailey Meter Co., Cleveland.

Gages—Bulletin 229. Functions and advantages of Model P indicating gages, refinery, hydraulic, and test gages.—The Foxboro Co., Foxboro, Mass.

Gas Generators — Bulletin 100-B 13. Inert gas generators and their safety features.—Roots-Connersville Blower Corp., Connersville, Ind.

Gaskets—Bulletin 51-A. Revised price list on oval and octagonal rings, and standard gaskets for ring-joint flanges.—Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.

Grease Gun—Folder. Models D-38, S-38, and S-38-H electric portable grease guns.—Pressurelube, Inc., 22 East 40th St., New York.

Grinders—Bulletin 1932. "De Luxe" heavy-duty and clearance types, attachments, specifications.—Diehl Mfg. Co., 90-98 Trumbull St., Elizabethport, N. J.

Hose—Catalog HD. Traces hose manufacture from baled crude rubber, through the factory and testing laboratory to its finished forms.—The DeVilbiss Co., Toledo.

Lamp—Bulletin 522. Cooper Hewitt, 100-watt fluorescent lamp. General description, photometric rating chart, footcandle table, specifications.—General Electric Vapor Lamp Co., Hoboken, N. J.

Lathe—Catalog 46-B. Eight types of the 9-in. Workshop precision lathe in 3-,

3½-, 4-, and 4½-ft. bed lengths.—South Bend Lathe Works, South Bend, Ind.

Lighting — Catalog 3. "Red Spot" fluorescent lighting equipment.—The F. W. Wakefield Brass Co., Vermilion, Ohio.

Meter.— Bulletin 194-A. "Synchro-Meter" for measuring flow, liquid level, pressure, and temperature at a distant point.—Bailey Meter Co., Cleveland.

Motors—Catalog 39. Electric motors, generators, and ventilating equipment. Price list.—Diehl Mfg. Co., 90-98 Trumbull St., Elizabethport, N. J.

Motors—Two leaflets. 2183-A: "Lo-Maintenance Direct Current Motors and Generators." 125-C: Construction and installation views of explosion-proof motors for fume-laden atmospheres.—Allis-Chalmers Mfg. Co., Milwaukee.

Motors — Bulletin 508E. Explosion-proof d.c. motors.—The Louis Allis Co., Milwaukee.

Nozzles—Form 4110. Spray nozzles with self-cleaning orifice. For humidifying, air-washing, evaporative cooling.—Supreme Electric Products Corp., 99 Mt. Hope Ave., Rochester, N. Y.

Oil Handling—Bulletin 28. Cans, buckets, funnels, and accessories for oil, and gasoline-handling and delivery.—George D. Ellis & Sons, Inc., 309 North 3rd St., Philadelphia.

Packings—Folder. "Tannate" leather packings. Cup leathers, U-leathers, flange leathers, and V-crimps.—J. E. Rhoads & Sons, 35 North Sixth St., Philadelphia.

Photoelectric Cells — Bullein B-2-B. Model 594, Types 1 and 2 "Photronic" cells for industrial and experimental applications.—Weston Electrical Instrument Corp., Newark, N. J.

Plastics—Booklet, "Molded Color" summarizes history and progress of the company's product. Pictures of applications. —Plaskon Co., Inc., Toledo.

Pumps—Leaflet 2199-C. Single suction, single stage, close coupled utility pumps for handling 10-1,600 gal. per min., and using motors up to 75 hp.—Allis-Chalmers Mfg. Co., Milwaukee.

Pumps — Bulletin W-319-B1A. High-pressure, forged-steel-casing centrifugal pumps for application to high pressure steam generating units. — Worthington Pump and Machinery Corp., Harrison, N. J.

Records—"101 Famous Visible Record Forms." Short cuts in business record-keeping methods—forms covering accident, advertising, installment, insurance, etc.—Acme Card System Co., 8 South Michigan Ave., Chicago.

Regulators—B.2165. Type SU induction feeder voltage regulator.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Resistors—Leaflet 1734-B. Instructions on manufacture and care of grid-type resistors for d.c. and a.c. motors, suggestions on renewal parts, table of duty cycles.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Safety Cut-Out—Bulletin 39-1. Overload safety cut-out designed to eliminate shearpin on power drives.—Anchor Steel & Conveyor Co., 2563 Bellevue Ave., Detroit.

Standards—1939 Index. A. S. T. M. standards and tentative standards, including list of A. S. T. M. serial designations. —American Society for Testing Materials, 260 South Broad St., Philadelphia.

Starters—Descriptive Data 11-200. Nonreversing linestarters, Type F, for squirrel-cage and wound-rotor motors. Inclosures for "De-ion" linestarters.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Steel—Stock List. "House of Stainless." A 72-page list of stainless steel products, laboratory corrosion data, weight tables.—Republic Steel Corp., Cleveland.

Switches — Descriptive Data 15-100. Type SM heavy-duty master switches for mill and crane controllers.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Temperature Indicators — Catalog N-33A(5). Manually operated indicators for thermocouple temperatures; portable or table model, for switchboard mounting.—Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia.

Thermometer—Bulletin 4201. Indicating control therometer, series 4200, for non-corrosive media and temperatures up to 1,000 deg. F.—Wheelco Instruments Co., 1929-33 South Halsted St., Chicago.

Thread Tips—Folder. "Lanhydro" hydraulically operated turning machine and "Landmaco" threading machine.—Landis Machine Co., Inc., Waynesboro, Pa.

Unit Heaters—Bulletin W-N 105. Series F unit heaters for heating lobbies, corridors, offices, showrooms, etc. Capacities, dimensions, specifications.—John J. Nesbitt, Inc., Holmesburg, Philadelphia.

Valves—Bulletin. "Duravalve" installations up to 1,500 lb., 950 deg. F., test reports, engineering data.—Hancock Valve Div., Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Washfountains—Form R219. Semi-circular washfountains 54- and 36-in. diameter sizes in enameled iron and stainless steel.—Bradley Washfountain Co., North 22d & West Michigan Sts., Milwaukee.

Washroom Service—Form 1057. Basic rules on sanitation management, maintenance, and equipment.—Scott Paper Co., Chester, Pa.

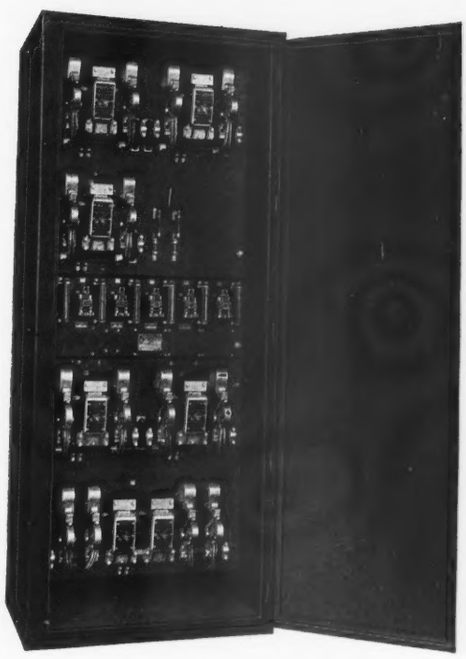
Waterproofing—Circulars. VVV cement waterproofing and bonding compounds. Price list.—Ranetite Mfg. Co., Inc., 1917 South Broadway, St. Louis.

Welding Contactor — Descriptive Data 18-345. "Ignitron" a.c. welding contactor without timing.—Westinghouse Electric & Mfg. Co., East Pittsburgh.

Welding Fittings—Circular 309. Fittings designed especially for small welded lines. Tables on hydrostatic bursting pressures, tensile pull tests, working pressures.—Crane Co., 836 South Michigan Ave., Chicago.

Wrought Iron—Bulletin. "The Welding of Wrought Iron"—processes and procedures, physical properties. Information

EC&M MAGNETIC STARTER for WOUND ROTOR MOTOR



THIS illustration shows a push-button-operated EC&M Full Magnetic Starter for use with a 600 HP, 2300 Volt A.C. Wound Rotor Motor driving a crusher in a cement mill. The primary circuit to the motor is handled by an EC&M Type ZHS, Bulletin 1062-B, oil-immersed, high voltage contactor, arranged for separate mounting. Resistors for the secondary circuit are EC&M Nickel Alloy type and are also arranged for separate mounting.

In general, with a drive of this type, it is desirable to apply maximum motor torque during acceleration to get the motor up to speed quickly. The new EC&M Frequency Relays, used for automatically controlling the acceleration of the motor, provide the ideal solution by permitting maximum desired torque to be maintained at the motor shaft during the accelerating cycle.

Write or wire us today for further information on EC&M *Frequency-Relay-Controlled* Magnetic Starters for wound rotor motors.

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HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

based on field work and tests.—A. M. Byers Co., 6th and Bingham Sts., Pittsburgh.

Water Analysis—Manual, 4th edition. Facts on various standard tests, methods of analysis, T H Q and Betz-Hellige methods for sulfate determination.—W. H. & L. D. Betz, 235 West Wyoming Ave., Philadelphia.

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BOOKS

NATIONAL INCOME IN THE UNITED STATES 1799-1938

Robert F. Martin, Director, Economic Research Division, National Industrial Conference Board, National Industrial Conference Board, Inc., 247 Park Ave., New York. 146 pages, tables, charts. $3.50.

Based on the best approximations available at present, this book contains estimates of national income in the United States for the past forty years. The sources of the national income for each year and period are estimated both by kind—salaries and wages, entrepreneurial income, dividends, interest and rent; and by industrial origin—agriculture, mining, manufacturing, construction, trade, service and others. Government as a direct source of income is also treated.

INDUSTRIAL POLITICAL ECONOMY

Edward Henry Hempel, Columbia University. Pitman Publishing Corp., 2 West 45th St., New York. 454 pages, bibliography, index. $3.50.

The author presents a history of political economy in its relation to industry and industrial systems that have existed at various times in the world. The industrial developments of France and England are considered, to show the widening of the scope and range of economic problems and the deliberation statesmen and governing bodies have given to them. Four systems under which industry operated in early days are covered: the Greek, the Roman, the democratic system of the Dutch, and the self-rule conditions of the guilds.

INDUSTRIAL ARCHITECTURE OF ALBERT KAHN INC.

George Nelson. Architectural Book Publishing Co., Inc., 112 West 46th St., New York. 176 pages, 200 illustrations, diagrams and floor plans. $6.

This unique pictorial presentation of industrial plants designed by Albert Kahn Inc. shows plant engineers industrial buildings built around the product and production techniques. Any industrialist will find here pictures of modern buildings and reproductions of their plans—buildings designed for operating efficiency, with regard for employees' convenience and comfort, and with attention to appearance so that the public's favorable attention can be attracted. Among the buildings illustrated are automobile factories, assembly plants, power houses, steel mills, plants for manufacturing diesel engines, airplanes, office equipment, cosmetics, and pharmaceutics.

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ON THE CALENDAR

MAY

2–4, Chamber of Commerce of the United States, Annual Meeting, Washington, D. C. Ralph Bradford, Acting Secretary, 1615 H St., N. W., Washington, D. C.

8–12, National Fire Protection Association, Annual Meeting, Chicago. Franklin H. Wentworth, Managing Director, 60 Batterymarch St., Boston.

22–25, National Association of Purchasing Agents, Annual Meeting, San Francisco. G. A. Renard, Secretary, 11 Park Place, New York.

JUNE

13–16, Smoke Prevention Association, Thirty-third Annual Convention, Milwaukee. Frank A. Chambers, Secretary-Treasurer, 139 North Clark St., Chicago.

26–29, National Association of Cost Accountants, Annual Meeting, Atlantic City. S. C. McLeod, Secretary, 385 Madison Ave., New York.

26–30, American Society for Testing Materials, Annual Meeting, Atlantic City. C. L. Warwick, Secretary-Treasurer, 260 South Broad St., Philadelphia.

JULY

2–5, American Society of Heating & Ventilating Engineers, Semi-annual Meeting, Mackinac Island, Mich. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

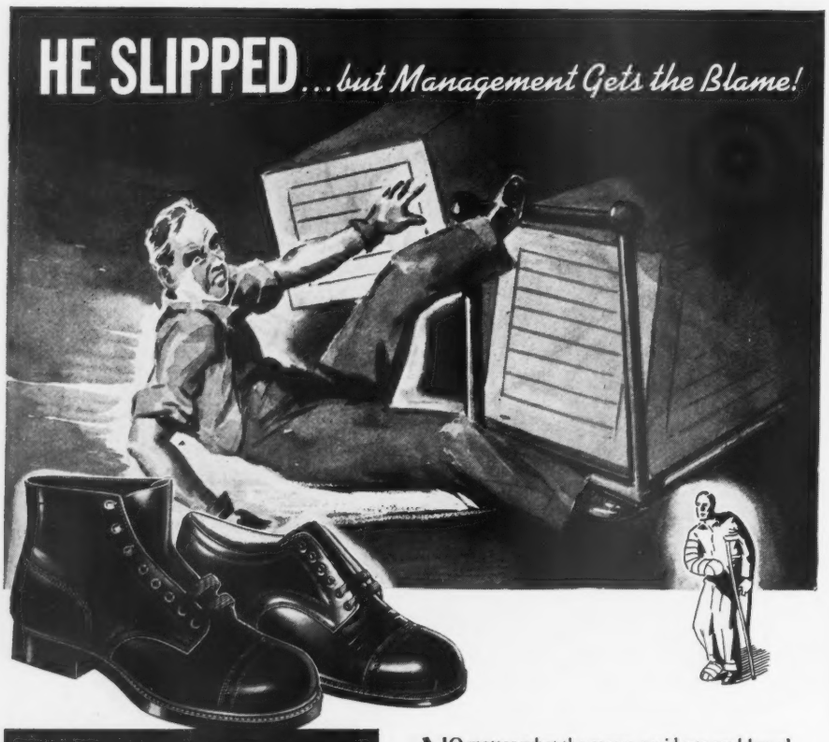
10–14, American Society of Mechanical Engineers, Semi-annual Meeting, San Francisco. C. E. Davies, Secretary, 29 West 39th St., New York.

UNIVERSITY SUMMER COURSES FOR EXECUTIVES AND ENGINEERS

June 5–17, Course in Statistical Methods for Quality Control, Massachusetts Institute of Technology. H. A. Freeman, Department of Economics, Massachusetts Institute of Technology, Cambridge, Mass.

June 12–30, Summer Management Course, including special work in motion and time study, University of Iowa, Iowa City. Ralph M. Barnes, 107 Engineering Bldg., University of Iowa, Iowa City.

June 24–July 3, Ninth Annual Economics Conference for Engineers, Stevens Institute of Technology and Management Division of The American Society of Mechanical Engineers, Stevens Engineering Camp, Johnsonburg, N. J. Prof. George W. Barnwell, Stevens Institute of Technology, Hoboken, N. J.



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A truckload of heavy-gauge flat plates, WEIGHING 9300 POUNDS, slid onto a worker's foot. Lucky for him he was wearing this Hy-Test shoe. *No lost time!*

A 600-pound barrel of chemicals fell 2½ feet on this Hy-Test Safety Shoe, but the usual result . . . *not a scratch!*

"Turret-top" Toe Protection

This is the special steel box cap in all Hy-Test Safety Shoes. It is anchored securely to the sole by the deep flange which makes it doubly strong and safe.

NO matter what the causes, accidents are blamed on management...and management pays the bills! Men must be kept on their feet...on the job. That is *responsibility* of management under the labor relations code of today.

To keep workers on their feet, safety must begin with the feet. All your workers should wear Hy-Test Safety Shoes. Their steel "turret-top" toe cap protects toes even under terrific blows. Hy-Test shoes also have soles that prevent slips, soles that protect against heat, and many other safety features. Special models suit every working condition. All models are as comfortable and many are as good-looking as ordinary shoes.

So call these facts to the attention of the man responsible for safety in your plant. He'll want to write for *Industry Speaks,* which tells how you cut your *total* hospital and compensation costs as much as 20% with Hy-Test Safety Shoes.

Later, if you wish, a Hy-Test man will call, show samples, and tell of the Hy-Test co-operative plan for promoting safety shoes to workers.

HY-TEST INTERNATIONAL SHOE CO. SAFETY SHOES

HY-TEST SAFETY SHOES

Designed and Manufactured Exclusively by Hy-Test Division, The International Shoe Co., St. Louis, Mo., The Nation's Largest Shoe Manufacturer

Five Ways To Get More Light

(Continued from page 70)

our Pittsfield Works in order to meet present-day requirements a comprehensive study of the entire layout was made. Various methods of increasing the existing copper capacity were studied, with the result that it was decided to bring the power transformers as close as possible to the load centers. Advantages of this general scheme have been recognized by many plant engineers for some time, but until recently large-capacity transformers used indoors had to be inclosed in a fireproof vault. In cases where vault installations were not desirable the usual alternative was to place the transformer outdoors, which meant longer secondary runs to the loads. However, development of transformers filled with a non-flammable liquid, Pyranol, has increased the flexibility of application by making open, indoor installations possible.

Study of our conditions showed that a saving of approximately 40 per cent could be made over other methods of increasing the capacity of the lighting system, by placing these transformers at important load centers. The principal saving was in the amount of secondary copper required. Size and length of secondary runs are of great influence from the standpoint of voltage adequacy at each lamp socket.

Short Secondary Runs

In our installation it was decided to run the 2,300-volt primary feeders directly to the load centers through exposed conduit and there install Pyranol transformers rated 2,300/115/230 volts. The connections are shown in Figure 5. This layout was used because it gave the shortest secondary runs, under the circumstances.

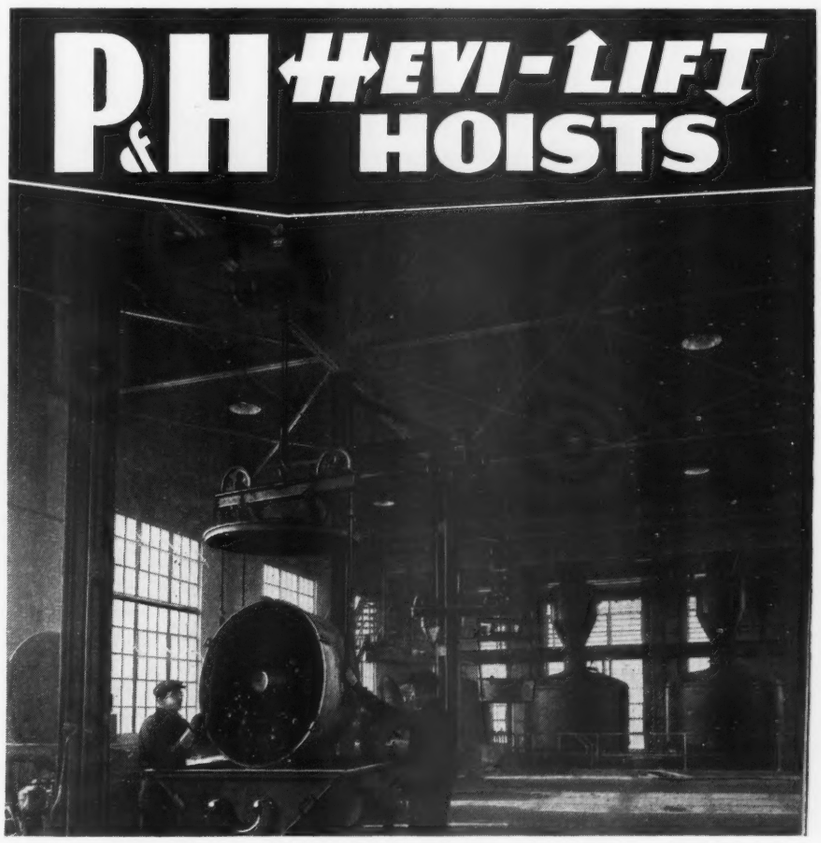
A 50 per cent margin of increase in lamp size over existing requirements must be considered in any present-day installation, and location of the power supply at the load centers makes this provision easier than do most other wiring schemes.

In the group of buildings where this method of connection has so far been employed, the transformers have been installed on steel platforms hung from the building columns. Figure 6 shows a typical installation. In this position no floor space is tied up, there is no interference with lighting or cranes, and the transformers are readily accessible for inspection. Since the transformers are of relatively small rating, 100 kva., no difficulty was encountered in mounting them on the columns. Furthermore, the steel platforms and supporting members are not too heavy.

In some instances an air-cooled regulator designed for a 10 per cent increase or decrease in voltage was mounted directly on the platform beside the transformer. At other times it was more convenient to install the regulator in the substation.

Obviously every installation presents its own specific problems which require individual treatment. Our experience with the general problem of increasing the capacity of existing lighting systems leads to the feeling that serious consideration should be given to the load-center scheme. New installations may present an entirely different problem and give the plant engineer a better opportunity to work out whatever plan he considers best. In arriving at a decision it is advisable nevertheless to make a careful comparison of transformer costs, copper cost, labor charges, and the results which can be expected.

The present installations have given such satisfactory service and shown such economies over all other methods which were investigated that the same principles will be used in all future installations at Pittsfield.



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Whether it's steel or cotton—whether it's moved a few feet or many feet—electric power with P&H Hoists will cost you less than man-power. P&H Engineers will gladly show you how "thru the air" handling can help you get more production from the equipment you already have. Your request for advice carries no obligation. Write us. The Harnischfeger Corporation, 4525 W. National Avenue, Milwaukee, Wis.

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HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

To Help You Arbitrate

(Continued from page 53)

give each man at least two days' work a week, the employer was free to lay off knitters so as to permit those remaining to work two days a week. Furthermore, layoffs were to be made in accordance with seniority. Both parties found the award acceptable.

In another case, a shoe manufacturer changed to a new last that employees claimed took more time per pair of shoes. When employees asked for an adjustment in rate of pay, the employer admitted greater difficulty, but agreement on the change in rate could not be arrived at. The arbitrator, after visiting the factory with union and company representatives, found that normal output of the old last was 10 pairs in an 8-hour day, and 9 pairs a day on the new. He awarded an extra 8 cents on a pair, pointing out that the men were inexperienced on the new last and that the delay was due to that fact. The rate would be revised when the rate agreement with the union expired.

Formed in 1926 by a group of business men interested in establishing and maintaining a national system of commercial arbitration, the American Arbitration Association is a non-partisan, non-profit organization, supported by voluntary contributions and paid memberships of public-spirited men and women, business firms, trade associations, and labor organizations. Its officers and directors, serving without pay, are prominent lawyers and business leaders. Only cost incurred in using its facilities is a nominal charge for use of the hearing rooms and clerical services.

In more than 1,600 cities and towns, services of the Association's VIAT are available. There is a panel of more than 7,000 arbitrators from which parties to labor disputes can choose one or more acceptable to both sides. All men of standing, these arbitrators are chosen for their integrity, impartiality, and competence. They serve without pay, unless the two parties, for reasons of their own, authorize payment.

Proceedings in the tribunal are based on contracts or agreements between labor and management, the agreement to arbitrate under the tribunal's auspices having been written into the labor contract. For example, here is one type of arbitration clause now in use:

"If any controversy or question arises which threatens the friendly relations existing between the parties to this contract, and for which no provision for arbitration has been made, either party may apply to the American Arbitration Association for such services as will tend to avert the violation of the contract or to promote its amicable observance or facilitate the peaceful changes to be effected thereunder."

Arbitration Laws Apply

VIAT does not function as a negotiating or mediating body for, under its rules, all conciliatory processes must have been exhausted and failed before this board of arbitrators will be convened. If, however, the parties reach an agreement by themselves while proceedings are going on, the arbitrators may give the agreement the status of an award. An award has the standing of a court judgment, for these proceedings are conducted under state arbitration laws.

Disputes brought to settlement by the tribunal already cover a wide range of management-labor controversies. Union jurisdiction, seniority rights, hours of work, have come up for decision. Questions like these have been settled: Under what circumstances may an employer refuse to employ a workman after a strike? Under what circumstances may an employer remove

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You may not handle as many tons a month as this Colson user—but whatever your volume, extra handling adds to costs—subtracts from profits. With the Colson Lift Jack System you can reduce unnecessary handling . . . move goods easier and faster . . . never "freeze-up" storage space.

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The Colson Lift Jack System is one of the most inexpensive handling systems available today. As little as $150 will buy a Colson Lift Jack and several sturdy platforms. You can add to the equipment as needed. Ask for a Colson representative who will study your handling requirements. He will show you how the Colson System can save for you.

Colson Platforms are made in a wide variety of styles and sizes.

THE COLSON CORPORATION ELYRIA OHIO

his factory? Are employees morally justified in continuing to work after a strike is called by the union of which they are members? Under what conditions is an employer required to fill a vacancy on demand of a union?

In all cases this arbitration technique has been employed at the request of one of the parties after both had previously agreed to take their dispute to the tribunal, if they could reach a decision in no other way.

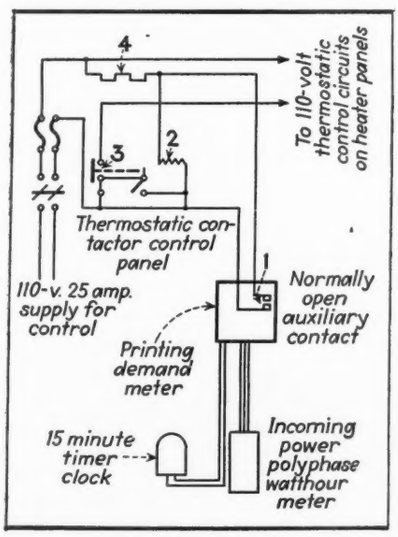
In the light of the National Labor Relations Board ruling in the Inland Steel Company case, services of the tribunal should now be in greater demand. Saying in effect that a refusal to commit an agreement with a union to writing was a refusal to bargain, the Board has made it a certainty that more and more agreements will be put in writing in the form of contracts. And a single clause inserted in those contracts, stipulating that, if an agreement can be reached no other way, a dispute will be taken to VIAT for arbitration before impartial arbitrators chosen by the two parties, will insure the good offices of an organization committed to minimizing industrial strife.

How 6 Plants Save by Limiting Demand

(Continued from page 65)

500-kw. transformers, respectively. Altogether it is a difficult load to control properly.

In January, 1936, we installed a General Electric demand limitator which is connected directly to our electric melting furnaces through the main power meter. When the load reaches a predetermined level the contactor closes and through a tripping mechanism unloads the main circuit breaker on one or both furnaces, as may be required. The circuit breakers must then be closed manually before resuming operations.



This is the control circuit employed to limit demand by controlling the operation of certain electrically heated equipment

Our sole consideration in installing this equipment was to cooperate with the power company, and effect a saving in our power bills.

This equipment has reduced our demand approximately 150 kw. and effected a saving of approximately $175 a month. The only disadvantage to its use is the necessity of arranging operating schedules to suit the circumstances.

Besides the saving involved, this demand control equipment has made us more "power conscious" and more attentive to our other electrical equipment.—*C. R. Cullen, Vice-President, Carondelet Foundry Company.*

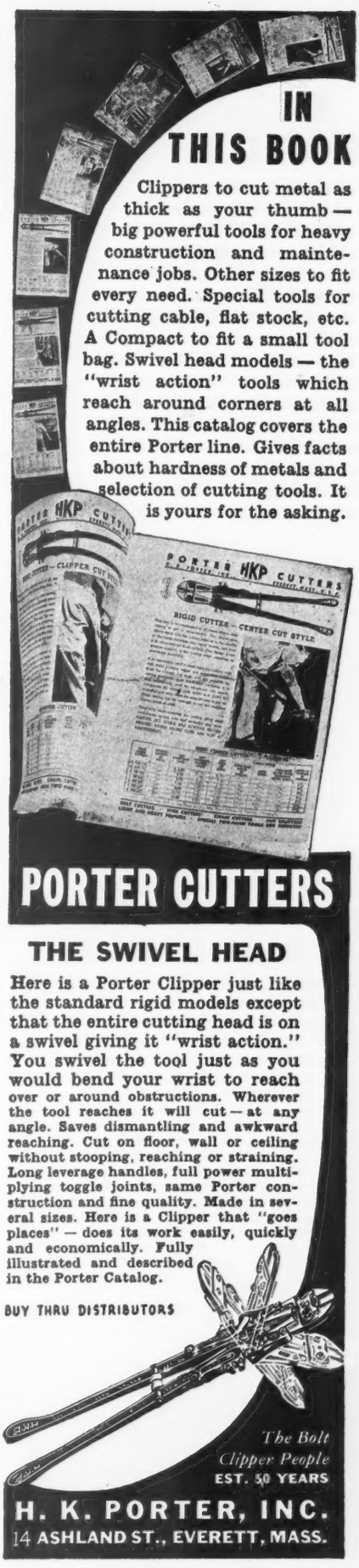
6

AT THE TIME the problem of controlling electrical demand was first considered about half of the load consisted of motors, with lighting and heating devices each accounting for about one-fourth of the load. The connected load of heating devices, consisting of several electrically heated oven, vacuum drying tanks, and impregnating tanks, was thermostatically controlled with the result that at times the registered demand from this group of apparatus reached objectionably high figures. It was found that no sacrifice in the efficiency of operation of our industrial heating equipment was experienced when these devices were regulated in such a way as to interrupt for short intervals the circuit supplying this group.

The problem could have been ideally handled by the application of available demand limitators which would interrupt the various heating loads on the basis of a priority listing.

Before electing to invest in a demand limitator, however, we tried out a scheme which employs a standard printing demand meter with adjustable, normally open contacts. These contacts are actuated by a movable arm mounted on the meter shaft. This arm was placed in such position that when the impulses from the integrating meter have advanced the demand meter to a predetermined point, the arm engages and closes a set of contacts, marked *1* in the accompanying connection diagram.

Closure of these contacts short-circuits magnetic coil *2*, which opens the circuit at point *3* and thus interrupts the control circuit supplying the holding coils on the magnetic contactors which form a part of the control equipment


IN
THIS BOOK
Clippers to cut metal as thick as your thumb — big powerful tools for heavy construction and maintenance jobs. Other sizes to fit every need. Special tools for cutting cable, flat stock, etc. A Compact to fit a small tool bag. Swivel head models — the "wrist action" tools which reach around corners at all angles. This catalog covers the entire Porter line. Gives facts about hardness of metals and selection of cutting tools. It is yours for the asking.
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Here is a Porter Clipper just like the standard rigid models except that the entire cutting head is on a swivel giving it "wrist action." You swivel the tool just as you would bend your wrist to reach over or around obstructions. Wherever the tool reaches it will cut — at any angle. Saves dismantling and awkward reaching. Cut on floor, wall or ceiling without stooping, reaching or straining. Long leverage handles, full power multiplying toggle joints, same Porter construction and fine quality. Made in several sizes. Here is a Clipper that "goes places" — does its work easily, quickly and economically. Fully illustrated and described in the Porter Catalog.
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BROWNING PRODUCTS
DIESEL GASOLINE STEAM ELECTRIC

of the heating devices. (Resistor *4* is connected at the point shown merely for the purpose of limiting the current flow through the contacts when coil *2* is short-circuited. The contactor equipment, of which items *2*, *3*, and *4* are component parts, is a duplicate of the thermostatic control panels employed in connection with the heating equipments.)

Operation of this equipment, which was originally installed ten years ago, has resulted in a reduction of 200 kilowatts in the power demand, with an annual saving of $3,000 in power costs. The cost of additional control equipment installed was absorbed in less than two months by the saving in power bills.—*R. J. Benson, Chief Electrician, Wagner Electric Corporation.*

A Maintenance Budget? Why Not?

(Continued from page 63)

floors, roofs, motors, wiring, flasks and boards, heating systems, piping, electric furnaces, windows.

Now how is a control established to insure that the amount expended does not exceed this budgeted sum?

On general maintenance, labor and material are charged directly against the particular department where the work is performed. If a maintenance employee spends three hours oiling the machines in Department 20, that time is charged directly against that department's oiling budget through a time ticket made out by the maintenance department timekeeper. Other kinds of general or continuing maintenance, such as sweeping, window washing, janitor service, painting, and belt repairs, are handled in the same way.

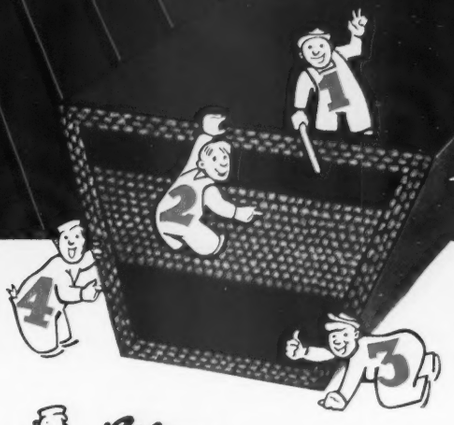
On special maintenance, all charges, both labor and material, are made against the approved monthly work order (Figure 1), set up to cover the work listed on it. Time tickets for maintenance labor (Figure 2), and requisitions for maintenance materials (Figure 3) used on each work order, are made out in the maintenance department and sent to the accounting department where they are entered on the order. Since the order also carries the figure for the approved expenditure for that class of work that month, a constant comparison is possible.

Attention should be called to one that appears on the work order shown, the line in the upper right-hand corner of the sheet, "Charge A/C." This refers to an overhead account to which the item in question is charged. In this way all special maintenance expenses

(Continued on page 109)

Presenting THE GILMER GANG

At a moment's notice, you can call in THE GILMER GANG in 64 countries and in the 48 states. That's a good thing to remember when you're ready to put The Gilmer Gang to work for you. For instance, The Gilmer Gang can solve your V-Belt problem with . . .



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Gilmer **Heavy Jackets**—Protect the belt's vital working parts from oil, dirt, and grease, making Gilmers last three times as long.

Gilmer **Controlled Stretch**—Pre-tested, to guarantee permanently matched working lengths on every job.

For multiple drives and f.h.p. jobs . . . get the "Precision-Plus" V-Belt you need—*and get it fast*—from Gilmer right nearby. See other side for the location of The Gilmer Gang's headquarters nearest you . . .

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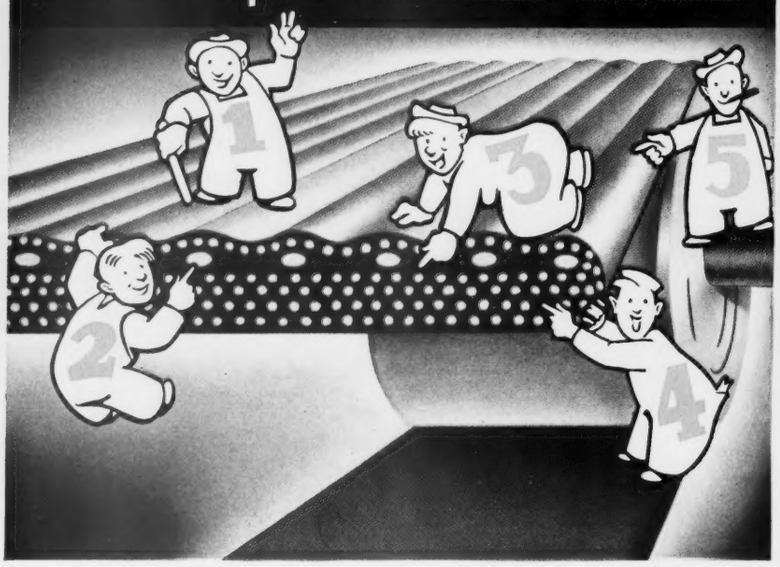
Gilmer

The GILMER GANG shows the efficiency of KABLE KORD



Corrugated surface—acts with contactor cord to insure terrific gripping qualities of the belt on the pulley.

Kable Kords—act as contactor belt, squeezing the pulling section of the belt tightly against the pulley.

High friction, heat-resisting rubber—a tough resilient rubber especially developed by Gilmer engineers to insure cool running at high speed.

Rubber-locked pulling cords—patented construction, concentrating brute strength in thin section makes cords ride parallel without twisting under pressure.

Controlled belt stretch—pre-tested to guarantee the permanent belt length under working tension.

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(Continued from page 106)

find their way into a general overhead that is budgeted for the plant as a whole.

Control is exercised through the departmental budgets for general maintenance expenses, and through the work order sheet for special maintenance. The budget department checks each department's general maintenance weekly against the budgeted allowance, and notifies each department head how well the figures jibe. Discrepancies or excesses are noted, of course, explanations secured, and plans made to change the trend if necessary.

Responsibility for keeping special maintenance charges in line lies with the accounting department which is not authorized to accept charges in excess of the amount shown on the face of the work order, nor can they accept any labor or material charges that do not appear in the description shown on the face of the order.

A check is also made by the plant engineer through use of a maintenance work card (Figure 4) which is issued for each job done by a maintenance employee. The labor time shown on these cards is, by use of the appropriate hourly wage rate, translated into dollars of expense. To this is added the money value of supplies consumed. This card includes work done by the maintenance department on both general and special maintenance.

Watches Labor Expense

This check is not by work orders, as is the accounting department's check, but by totals of each maintenance labor classification. For, as mentioned earlier, the estimate the plant engineer submitted at the time the budget was being prepared was in terms of the payroll requirements for each class of labor. If, when the monthly budget is reduced to a daily basis, it is evident that an excess over the plant engineer's budget, including general and special maintenance, is being spent, steps may be taken by the plant engineer to change the trend.

Incidentally, charging maintenance expense as a part of a manufacturing department's budget is done with malice aforethought. The foreman is thus put on his guard to see that maintenance work in his department is done with reasonable dispatch and efficiency. This of course affords additional assurance that general maintenance expense will conform to the budget.

A fairly simple plan permits this supervision by the foreman. It has been mentioned that the budget director makes out an indirect expense budget (Figure 5) for him at the begin-

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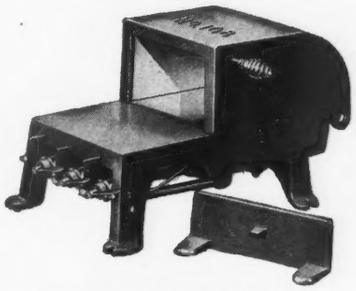

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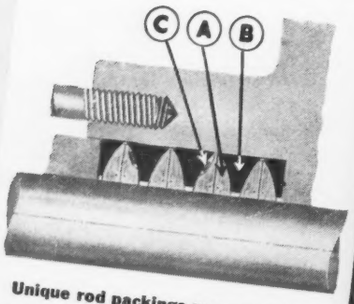

Unique rod packings use a combination of metallic rings, which seal the shaft, and neoprene rings, which seal the stuffing box.

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THE PROBLEM: In this compressor handling a combination of hydrogen and nitrogen gas at 170 pounds pressure, service conditions were so severe that rod packings had to be replaced every week. This was costly both in repair bills and in shut-down time.

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THE MATERIAL: Neoprene, Du Pont's chloroprene rubber, resembles natural rubber in strength, elasticity and toughness . . . but it is far less affected by oils, gasoline, heat, sunlight, or even corrosive acids and gases.

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RUBBER CHEMICALS DIVISION, WILMINGTON, DELAWARE

ning of each month, in which is stated the allowance for each expense that he, the foreman, has under his control. Then weekly, the accounting department issues the indirect labor analysis (Figure 6) showing the amount spent for these same items of expense. An appraisal of current standing is then easily made.

Some suggestion has been given as to the production foreman's relation to this budget plan. He plays a part in both special and general maintenance expense.

May Request Special Jobs

He may request that a job be done that comes under the special classification. This request comes to the plant engineer and is included as part of the engineer's estimate on one of the ten monthly work orders. In the case of general maintenance the foreman has his budget allowances, determined by the budget department from past ratios of each type of expense to productive labor.

It would be unlikely that a foreman would skimp on his general maintenance expense. It is to be remembered that the plant engineer has his ideas as to what proper maintenance should be and, in fact, his budget for general maintenance is based on these ideas. Attempts on the foreman's part to ask for too much maintenance would quickly collide with the plant engineer's professional standards.

Satisfactory for 10 Years

This budget plan has been in operation for ten years. It has proven eminently satisfactory. By it management is enabled to make its decisions on the proper allowance for maintenance expense in the light of all the pertinent facts and conditions, such as the expert opinion of the plant engineer, the budget "norms" derived from past experience, sales and production estimates, and management's knowledge of financial conditions. This sum, once determined, is, through the mechanism of the standing work orders for special jobs and the budgeted allowances for general maintenance, easily controlled to prevent the actual from varying greatly from the the estimated expense.

Experience through these depression years points to the desirability of setting up reserves for special items of maintenance expense that recur frequently. An example of this is replacing a roof or a floor. As a result of several years' experience, recorded on the maintenance work cards on file in the plant engineer's office, it will be possible to calculate a basis for these reserves.

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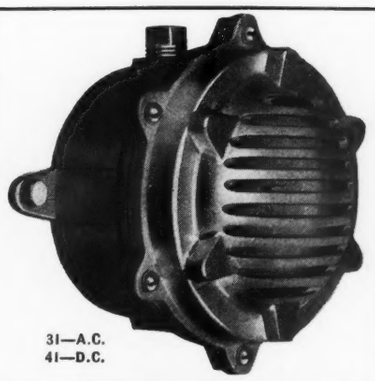

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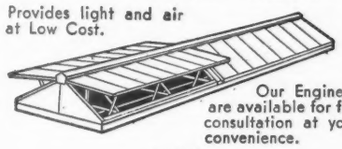

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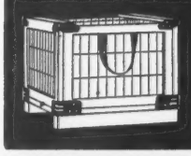

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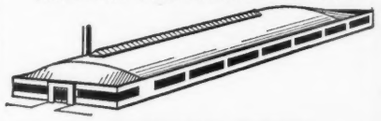

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129	5	Whse.	SK	850	5	40	Whse.	SK	775
37	7½	Whse.	SK	1750	4	50	Whse.	SK	1700
21	7½	Whse.	SK	1150	3	50	Whse.	SK	1150
86	7½	Whse.	SK	850	1	50	Whse.	SK	565
22	10	Whse.	SK	1750	1	60	Whse.	SK	680
17	10	Whse.	SK	1150	2	60	G.E.	RC 132	1700
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34	15	Whse.	SK	1150	1	75	Whse.	SK	1750
10	15	Whse.	SK	825	1	75	Whse.	SK	1150
16	15	Whse.	SK	850	1	75	Whse.	SK	850
19	20	Whse.	SK	1750	1	75	Allis	E-131	1750
33	20	Whse.	SK	1150	2	25	Reliance		1150
7	20	Whse.	SK	750	1	75	Reliance		850
2	25	Whse.	SK	1750	1	100	G.E.	R.C.	1750
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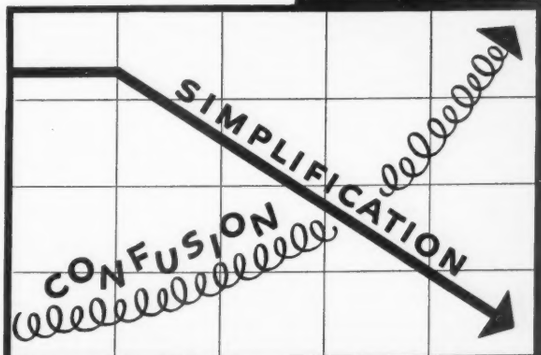

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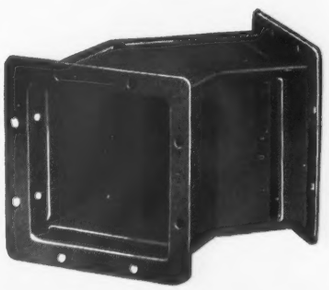

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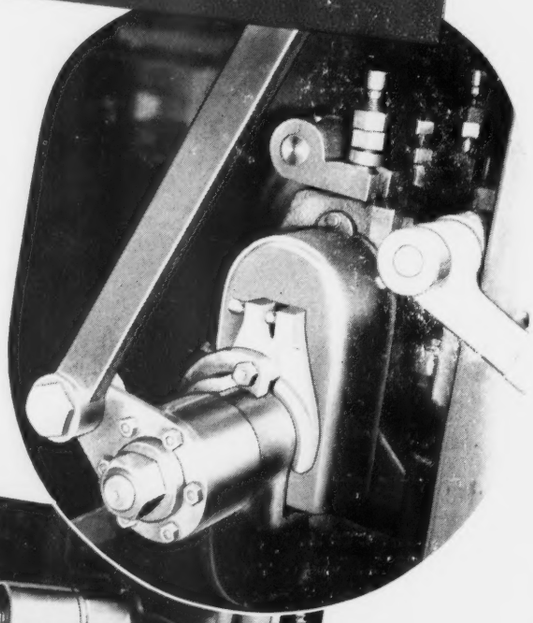

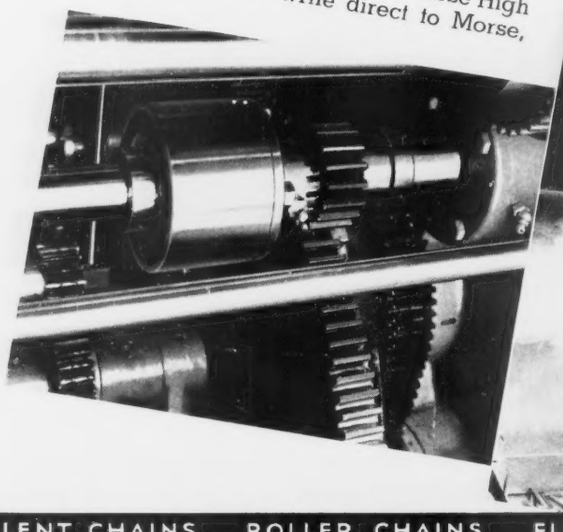

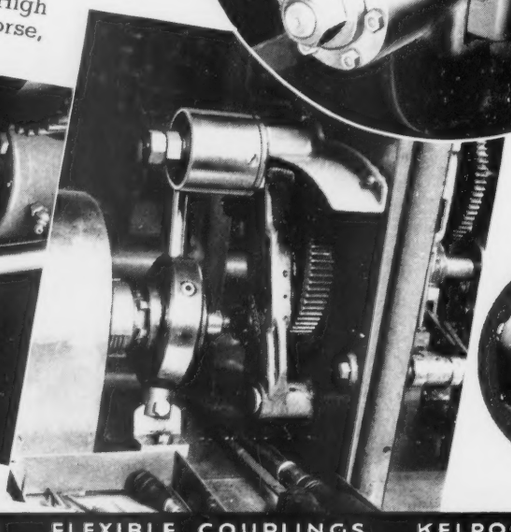

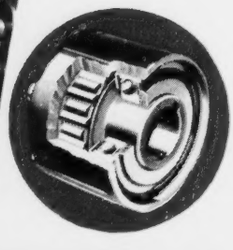

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